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The Man Without a Job

THOUGH there is evidence of revived activity in the manufacturing sections of the electrical industry, and the consumption of electricity for all purposes is advancing, there is no lessening of the feeling of insecurity that has been so widespread in recent years amongst technical, administrative and electricity supply staffs. The subject has been ventilated periodically in our "Correspondence" columns by highly qualified men who have come up against totally unexpected calamity while in the prime of life.

No excuse, therefore, need be pleaded for asking our readers—from the heads of the industry down to its humblest member—to devote a little time to a careful consideration of the article on "Pensions and Compensation" by Mr. J. W. Thomas in this issue.

As the author points out in the course of his analysis of the situation, the national system of unemployment insurance in this country excludes from its scope staffs whose salaries exceed £250 per annum. We share his opinion that the feeling of insecurity is probably more acute amongst such men than it is amongst wage-earners.

He reviews the various causes of unemployment—illness or accidental incapacity, rationalisation, industrial depression and old age, and examines the merits of various pension schemes in such a way as to form a basis for discussion of the subject by all classes.

It is hoped that the resulting deliberations will lead to an expansion of joint-contribution pension schemes and to serious efforts to raise salary limits under the national insurance systems; but whatever moves forward may be made in these directions we shall not be relieved of our obligations as an industry to the Electrical Industries Benevolent Association.

This organisation was formed very many years ago to relieve distress and anxiety and to ease pain for many electrical men and women who are uncared for by any kind of pension or national insurance scheme. Many a time we have earnestly and urgently appealed on behalf of this Fund, in which, it seems, comparatively few take a deep practical interest, and we do so again now because the need so sorely presses. We ask for a real common-interest spirit—the willingness to bear one another's burdens.

Adopting a suggestion which originated with Mr. E. E. Sharp, Chairman of the Association, we ask all electrical income-tax payers to examine the figures on their assessment forms and then work out a simple-division sum.

Having convinced themselves, as it should be easy to do, that it is their duty to help electrical people who have either no income at all because they are unemployed, or are in debt or serious ill-health, or regarded as "too old at —," let them resolve to discharge their responsibility straightaway.

The amount of the cheque which Mr. Sharp thinks they will regard as suited to the present distressing state of affairs is one-tenth of the amount of their assessment, and it should be forwarded to Capt. J. T. Keeping, the Secretary, at 9, Southampton Street, London, W.C.1. The object is to get electrical men to adopt a definite basis of giving to assist their fellows.

We could use a hundred arguments why the funds of the Association should be doubled or trebled. Every day cases are coming before most of us of men who have fallen out by the way. They cause us the utmost perplexity as we share in their heart-ache, trying to turn it into gaiety and confidence. Much more trying must it be for members of the Executive who have claims—legitimate claims—to deal with in bulk at every sitting.

It is almost a matter to be ashamed of that after all these years of effort the great electrical industry can only dole out the present paltry pittances. Who will lead the way with a substantial donation such as one hears of in other industries? Who, too, will be ready to follow the lead, so that the Association may be made strong and wealthy, firmly established as a refuge for those who are finding it hard to battle with the storms of life?

Theatre Installations

THE account given by Lt.-Col. G. Symonds in his lecture at the Building Centre of the drawing up of the new advisory "Manual of Safety Requirements in Theatres" showed how unsatisfactory has been the method of leaving technical details to the approval of the local licensing authorities. These alone have the power to enforce regulations, but they have hitherto been without guidance as to what constitutes a minimum standard of safety, and the police superintendents who act as fire inspectors in some of the smaller towns are hardly qualified to judge the soundness of electrical work. The principal electrical requirements of the Home Office are summarised in this issue. As Col. Symonds readily admitted, the Manual is not perfect, and constructive criticism from our readers should therefore be helpful, particularly in view of the proposed revision of the Cinematograph Regulations, which, unlike those relating to theatres, are of statutory significance.

Chillspots at a Gas Meeting

AFTER its recent fantastic flights in the realm of advertising it hardly becomes the gas industry to pour scorn upon electrical propaganda. And yet at the annual meeting of the Commercial Gas Co. last week Dr. Carpenter, the chairman, was very caustic regarding the publicity efforts of "Pretty Fanny," as he will persist in calling electricity for no apparent reason. He jested particularly about a recent municipal demonstration (not a hundred miles from Poplar, we imagine) in which electric cooking was shown in a favourable light against older methods. The shareholders must have felt, however, that this was akin to jesting at a funeral when he referred to the cut in the dividend. Electricity suppliers were charged with deceiving the public as to costs, but even the most gas-soaked shareholder must have felt that there is something in electric cookers which the others haven't got. Dr. Carpenter confessed that the electric cooker was making its gas counterpart look shabby, and said that steps were being taken to produce brighter models. But all the chromium and enamel in the world will not deprive the gas cooker of its fatal odour. We suggest the provision of scent sprays which will automatically start up when the taps are turned.

Public or Private Supply?

THE paper read by Mr. J. A. Sumner before the I.E.E. last night was essentially a challenge to the claim sometimes advanced that heavy-oil engines can be operated for ½d. per kWh, often without reference to the annual load factor. A true comparison of costs is not easily obtainable, as few private plant owners have a clear knowledge of what their overall power costs really are, and the tariffs offered by many supply undertakings would defy analysis on an accurate cost-of-production basis. The hit-or-miss nature of power tariffs is shown by their great diversity in various parts of the country; their number should, as the author implies, be reduced as one of the first requisites of any reorganisation scheme. An undertaking has two aspects to consider: the first is the clear-cut issue of a new supply; the second is where a private plant is already installed. In the latter case, the standing and running charges involved in giving the supply are compared with the running charges only under the existing arrangement, and a narrow interpretation of the general prohibition of undue preference may hamper negotiations.

American Indecision

IT is somewhat difficult to understand from published American statements precisely what is happening in the States in the formulation of a national power policy, concerning which so much was heard last year. The position seems to be as indefinite as in the case of so many other American matters; a state of transition may possibly be the best way to describe the situation. From a report just to hand in the *Electrical World* it appears that representatives of the power industry met President Roosevelt and various officials in January, and conversations took place which covered such matters as the sale of electrical appliances on a nation-wide scale as part of the rural electrification programme, also general utility problems, including "holding" company legislation. It is stated that the discussions were encouraging, "but there are many problems to be worked out," and further that "there was no agreement on any particular thing," which we should have supposed was very discouraging. Later the President told a newspaper conference that he did not plan to set up authorities similar to the Tennessee Valley Authority in other sections "at the present time." He is also credited with saying that he *might* set up regional advisory power committees in different areas in the coming summer. A costly organisation is not intended, as he hopes to find experts who will serve without pay in helping to develop a future power programme.

Is the Power Plan Legal?

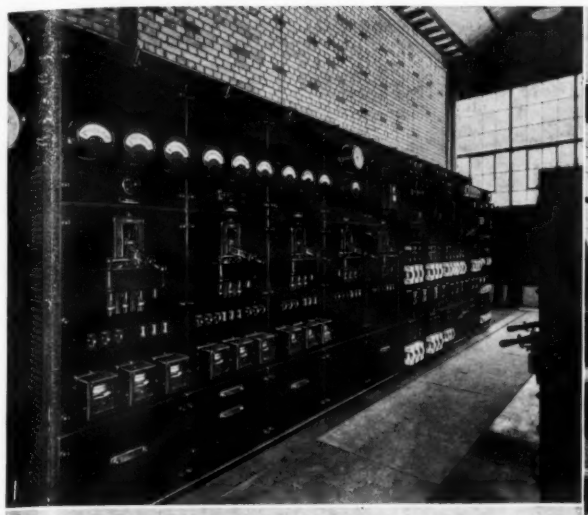
SINCE then things have been happening in the Courts—not regarding the Insulls, so far as we have read, for that matter seems to have lost its public interest, and possibly may be consigned to oblivion—but from an American dispatch to the London *Times* (February 25th) we gather that a blow has been struck at the Tennessee Valley Authority, and so at the Administration's plan for creating electrical utilities with public funds in many States. The "blow" is a decision on Friday last in a Federal Court in Alabama that it is illegal for the T.V.A. to sell electric power in competition with private companies. The decision may, or may not, receive support in the U.S. Supreme Court, but it is at least interesting to record that the judge in the Alabama Court said he failed to see "where the United States gets any power under the Constitution to engage in any business permanently." It is equally interesting to record that the Authority has already placed a million-dollar contract with the Westinghouse organisation for two water-wheel generators and equipment. What an extremely embarrassing situation!

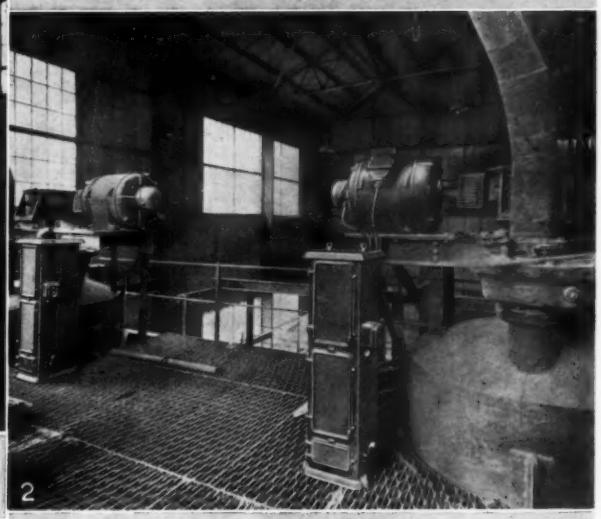
Vacuum Maintenance

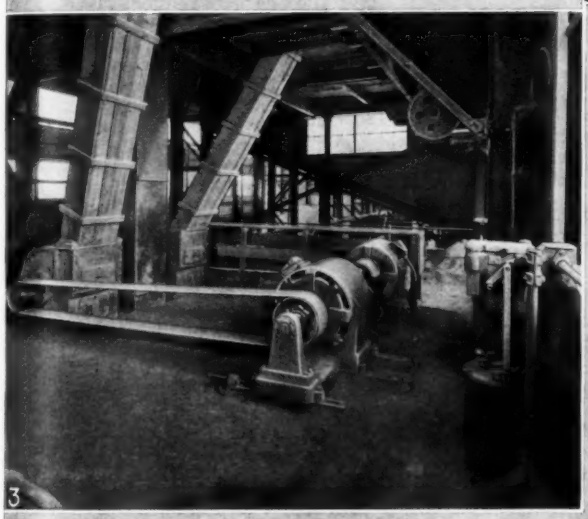
IT is the steam condenser that really dictates our generation policy, an adequate supply of cold circulating water being, from the quantitative point of view, about 500 times as important as a nearby supply of coal when selecting a power station site. Vacuum efficiency is the chief factor in securing turbine efficiency; yet less attention seems to have been devoted to the problems of securing a consistently high value here than in other and less important directions, thermo-dynamically speaking. This may be because so little of the maintenance work is due to mechanical defects. Even leaky tubes and air infiltration are of minor importance compared with the need to shut down the condensers periodically (with distressing frequency in well-wooded districts) to dislodge from the tube ends small quantities of leaves and twigs that get past even the best screens. All kinds of ingenious methods countering such difficulties have been successfully put into use in various power stations, but little is heard of them outside. The article by Mr. R. Wright included in this issue will probably be found of practical use by many resident engineers.

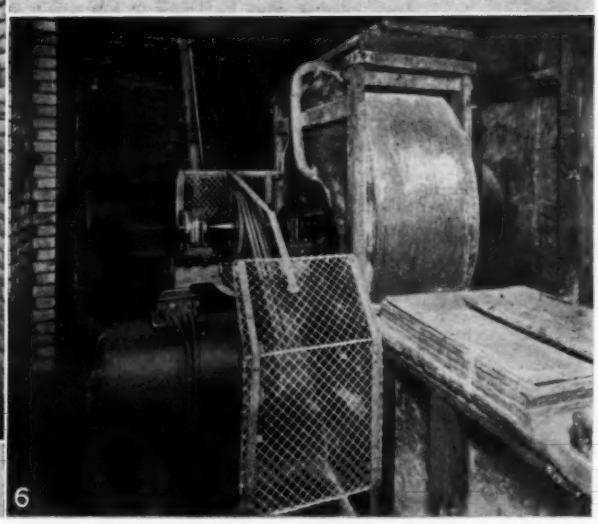
Sulphur and Grit

IN our last issue Mr. W. J. Crampton maintained that far from being harmful the emission of sulphur from power station chimneys might actually be beneficial. It was the tarry matter from domestic chimneys which was undesirable; in fact, the brimstone should be unaccompanied by "treacle." Now Mr. Thursfield, speaking on behalf of Chelsea residents, says that he is willing to swallow the sulphur, but objects to the solid matter which he avers is showered on the district by the Lots Road station. The nation needs men full of grit, but it is not the electricity supply industry's exclusive job to provide them.









The Application of Electrical Machinery in Fertiliser Manufacture

1. The main 400-V flat-back switchboard. 2. 15-h.p. totally-enclosed slip-ring motors with push-button-operated contactor starters driving mechanical agitators through bevel gears. 3. 50-h.p. frame-cooled slip-ring motors with manual starters driving pulverisers. 4. Fraser & Chalmers' "Sherwen" electro-magnetic vibrating screens for separating superphosphate. 5. 5-h.p. frame-cooled slip-ring motors driving mechanical furnaces and a cooling fan driven by a 7½-h.p. motor, together with three wall-mounted contactor starters. 6. 5-h.p. totally-enclosed squirrel-cage motor coupled to a suction fan drawing gases through the acid plant

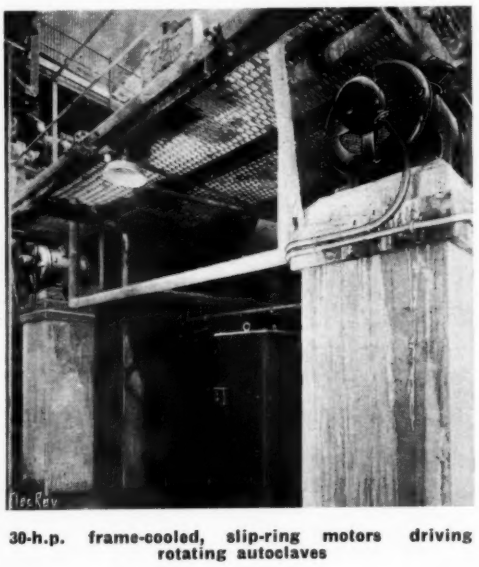
An Electrified Fertiliser Factory

The application of electrical machinery in superphosphate production

THE reduction of manufacturing costs to a low level is nowhere more necessary than in the supply of material to depressed trades such as agriculture, and in the new fertiliser factory erected by Messrs. Fison, Packard & Prentice, Ltd., at Cliff Quay, Ipswich, this is achieved by the use of the most modern equipment. The factory is designed for an output of 70,000 tons of superphosphates per annum, and is completely electrified; altogether about eighty "Witton" motors, ranging from 1½ to 50 h.p. and aggregating about 900 h.p., together with l.v. switchgear, distribution boards, electromagnetic vibrating screens, and other apparatus, have been supplied by the General Electric Co., Ltd.

Power is received from the Ipswich Corporation at 6,300 V 3-phase, 50 cycles, and is stepped down to 400 V in the works' sub-station, whence it is taken to a main l.v. flat-back switchboard in an adjacent building. This board consists of ten panels; five are equipped with oil circuit-breakers (three controlling the incoming supply from the transformers, one a synchronous condenser for power factor correction, and one a main feeder to the acid plant), while the remainder control feeders to various sections of the works. At the acid plant, which is situated on the hillside behind the main works, a four-panel flat-back switchboard is installed, one panel controlling the incoming supply and the others the works feeder circuits.

The synchronous condenser, housed in the main switchroom, is rated at 290 kVA at 1,000 r.p.m., and is capable of improving the power factor of the whole of the motors up to 0.95 lagging. With few exceptions, individual drives from induction motors are used throughout the factory. In many cases the presence of dust-laden air or acid fumes necessitates the use of totally enclosed motors, while ball bearings and dust-tight cases for distribution boards, control gear and back gears on conveyors are standardised throughout. A large number of the motors are of the totally enclosed, frame-cooled type embodying special cooling arrangements to give a larger output without increase of size. Except in a few special cases the motors are equipped with automatic contactor starters operated by push buttons, the squirrel-cage machines being provided with direct-to-line or star-delta starters, according to the size of motor and its duty, together with triple-pole isolating switches, and the slip-ring machines with rotor starting panels with time-limit control.



30-h.p. frame-cooled, slip-ring motors driving rotating autoclaves

Producing Ground Phosphate

Raw material (phosphate rock, pyrites, or coal) is brought from the docks to the works by underground belt conveyor, elevator and overhead main conveyor driven by motors of 7½, 20 and 22 h.p. respectively. Phosphate rock or coal is discharged from the main conveyor on to another driven by a 10-h.p. motor, which runs along the roof of a rock store of 12,000 tons capacity and which can discharge either rock at any required point in the store or coal on to a short belt conveyor driven by a 3-h.p. motor. Pyrites from the main conveyor is taken to the acid plant by a belt driven by a 25-h.p. motor. These conveyors are reversible and are provided with an elevator between them and a boom at the dock end (each driven by a 5-h.p. motor) so that the burnt ore can be returned for disposal and the fertilisers and other products loaded into ships.

Phosphate rock is reclaimed as required by a drag hoe capable of shifting forty tons an hour and operated by a two-drum friction winch driven by a 30-h.p., 720-r.p.m. motor; the manual starter is controlled by ropes and hand levers from the operator's platform, which is high up on the roof so as to give a clear view of the hoe in all positions. The rock is then taken by an elevator driven by a 5-h.p. motor to a belt conveyor operated by a 2½-h.p. back-geared motor and provided with a magnetic pulley to ensure that any magnetic material is removed before the rock enters the feed hopper for the grinding plant.

The magnetic pulley is fed with d.c. at 110 V from duplicate motor generator sets to ensure continuity of service, each consisting of a 3½-h.p. squirrel-cage motor driving a 2-kW compound-wound generator at 1,420 r.p.m.; the d.c. ends of these sets, which are installed in the main switchboard room, are controlled by an adjacent switch panel; they are started and stopped by a single starter fitted with a change-over switch to allow either set to be operated and remote controlled from push buttons in the grinding house.

The rock passes into a fine crusher belt driven at 200 r.p.m. by a 30-h.p. motor, the product being taken by an elevator (5-h.p. motor) and a 9-inch Redler conveyor (4-h.p. motor) to 18-ton hoppers feeding the ring-roll mills. The control gear for the whole of this plant, including the elevator and conveyor feeding the crusher and the magnetic-separator pulley, is mounted together and interlocked to ensure correct sequence of operation and also that the whole series of machines is automatically shut down if one of them is stopped.

Each of the three ring-roll mills has an outer ring which is belt driven by a 40-h.p. motor, and itself drives three spring-held rolls. The ground material is taken to centrifugal air separators on the floor above by elevators, a 20-h.p. motor driving each separator and its elevator through belting and line shafting. From the separators the fine material goes by Redler conveyor (3-h.p. motor) and an elevator (5-h.p. motor) to a storage hopper in the next building, the coarse material returning to the mills for further grinding. The starters for the centrifugal separators are mounted adjacent to those of the respective grinding mills on the ground floor and are interlocked, emergency push buttons for stopping any pair of machines being provided on the top floor.

Throughout the rock store and grinding plant all motors of 5 h.p. and above are of the frame-cooled, slip-ring type, smaller machines being driven by totally-enclosed squirrel-cage motors.

The Acid Plant

The sulphuric acid plant is of the latest Mills-Packard design and has a daily output of 95 tons of acid, the raw materials of which are pyrites and ammonia. The pyrites is loaded by a mechanical shovel into tip wagons which are taken by a lift (10-h.p. motor) to the upper floor of the furnace house and tipped into storage hoppers. Four mechanical roasting furnaces are provided, in each of which rotating shafts and arms are driven by a 5-h.p. motor direct-coupled through a worm reducing gear to bevel gears beneath the furnace. The starters for the motors are provided with relays to ensure instantaneous operation of the contactors in case of overloads, while the shafts and arms for each pair of furnaces are cooled by means of a fan direct-coupled to a 7½-h.p. motor. All the motors in the furnace house are of the frame-cooled, slip-ring type.

Liquid ammonia is fed by a centrifugal pump direct-coupled to a 6-h.p. totally-enclosed squirrel-cage motor to a two-unit oxidising plant capable of converting 120 cwt. of 25 per cent. liquid ammonia into nitric acid per week. Gases from the furnaces, after cleaning in an electrostatic precipitation plant, and nitric acid are passed through two Glover towers, five water-cooled acid chambers fitted with water sprays and finally through three Gay-Lussac towers, whence the sulphuric acid is pumped to a 20-ton tank for feeding to other tanks outside the phosphate rock store. The gases are drawn through the towers and chambers by two 28-in. diameter suction fans (one for each furnace), each coupled by vee-ropes to a 5-h.p. totally-enclosed squirrel-cage motor. The various acids are circulated by a battery of five double-plunger acid pumps belt-driven through line shafting from a 20-h.p. frame-cooled slip-ring motor.

Water is fed at high pressure to the chamber sprays by two treble-ram pumps, each coupled through vee-ropes to a 1½-h.p. high-torque motor; the cooling supply is circulated by two centrifugal pumps each with a capacity of 12,000 gal. per hr. and direct-coupled to a 10-h.p. motor. The water supply is drawn from a bore-hole about 100 ft. deep by a bucket-and-plunger pump (5-h.p. slip-ring motor). All the water pump motors are of the drip-proof type.

The superphosphates themselves are produced by means of

a chemical reaction between the ground phosphate rock and the sulphuric acid in digesters or "autoclaves" on the Oberphos system. The ground rock is taken out of the storage hopper and passed through a weighing hopper to a worm conveyor (2½-h.p. back-geared, squirrel-cage motor) leading to dust-charging hoppers, each of which is fitted with a mechanical agitator direct coupled through bevel gears to a 15-h.p. slip-ring motor. The sulphuric acid from the storage tank passes to a further tank from which it is lifted by a centrifugal pump driven through a flexible coupling by a 7½-h.p. squirrel-cage motor to a tank at the top of the building, whence it flows to the acid charging tanks. Totally enclosed motors are used throughout this section of the plant.

The Mixing Process

Simultaneous charging of ground rock and sulphuric acid into the autoclaves, each of which consists of a horizontal steam-jacketed barrel-shaped chamber, 21 ft. long and varying from 5 ft. 7 in. to 6 ft. 7 in. in external diameter, is carried out through a mixing valve. In order to ensure thorough mixing of the materials each autoclave is rotated at 4 to 5 r.p.m. by a 30-h.p. 960-r.p.m. frame-cooled slip-ring motor direct-coupled through gearing. Push-button control of both the autoclave motors and the agitator motors is provided from either machine. The autoclaves are connected by 24-in. pipes at the non-charging ends to two vacuum pumps and compressed air for both machines is supplied from a single compressor, pumps and compressor being each direct-coupled to a 50-h.p. protected-type, slip-ring motor with manual control gear.

Superphosphate in granular form is discharged through a central opening into a large hopper feeding a belt conveyor (3-h.p. motor) which takes it to a store. From here it is lifted as required by a crane and fed to a hopper provided with a grill, the lumps going to a cracker.

A main elevator driven by a 30-h.p. motor through belts and line shafting leads to two Fraser & Chalmers "Sherwen" vibrating screens of the electromagnetic type. These consist of two 6 ft. by 4 ft. single-deck a.c. units connected directly to the 400-V supply, the live frame being vibrated by means of solenoids connected in series with a half-wave metal rectifier, giving an intense vibration of 3,000 cycles per minute, which can be instantly varied if desired. Screening is very efficient and the power required is less than 2 h.p. The rectifier and vibrating mechanism are totally enclosed, pulleys and bearings are eliminated, and no lubrication is required.

Difficulties Overcome

Though the physical characteristics of superphosphates place them among the most difficult materials to screen efficiently, especially on a fine mesh, it has been found in practice that the "Sherwen" screens eliminate "blinding" (usually unavoidable) and give not only finer and better grading than the mechanically operated screens formerly used, but also more than double the output. As a result of the satisfactory operation of these two units two larger screens (10 ft. by 4 ft.) of the same type have been ordered for use in extensions of these works.

The fine material from the screens passes *via* an automatic weigher to the bags, which, after stitching by a sewing machine, are ready for dispatch; the weigher and stitching machine are belt-driven by motors of 4 and 2-h.p. respectively. The coarse material is taken to two pulverisers. Throughout the superphosphate store, screening plant, etc., frame-cooled slip-ring motors are used above 5 h.p. and totally enclosed squirrel-cage motors for the smaller sizes.

The main process-water is obtained from two bore-hole pumps, direct-coupled to 28-h.p. drip-proof, slip-ring motors and provided with contactor starters and triple-pole change-over switches. There is also a fire pump driven by a 52-h.p. protected-type, slip-ring motor with manual control gear.

Acknowledgments are due to Messrs. Fison, Packard & Prentice, Ltd., for providing facilities for taking photographs and for the preparation of this article.

Safety in Theatres

LAST week we commented on the issue by the Home Office of a "Manual of Safety Requirements in Theatres and Other Places of Entertainment" (Stationery Office, 2s. 6d.). Except in the case of cinemas, which are covered by regulations made in 1923 (now being revised) under the Cinematograph Act, 1909, the Secretary of State has no power to make regulations for such places, but the Royal Commission on Fire Brigades and Fire Prevention (1925) recommended that an advisory model code should be issued on the present basis with a view to securing a uniform standard of safety throughout the country.

The present recommendations are regarded as representing minimum requirements only. The section entitled "Lighting, Heating and Inflammable Liquids" contains a reference to the danger of gas as an emergency illuminant, as, without a stage roof vent, pressure originating from a fire on the stage may extinguish the lights.

Except where the premises are used occasionally and accommodate less than 300 people, safety lighting of the auditorium and exits must be from a source separate from that of the general lighting and in use during the whole time that the public is present. Electricity only is to be used for lighting the stage and certain other parts. Lampshades must be of incombustible material or prevented from coming into contact with lamps or holders.

In the section relating to "The Electrical Installation," Mr. H. W. Swann, Senior Electrical Inspector of Factories, refers to the possibility of the protective systems being obsolete due to the linking up of large sources of generation.

Except as specially provided, the installation must comply with the I.E.E. Regulations and all metalwork likely to become live has to be earthed. The intakes of main supply cables are to be sealed; the same applies to cable ducts at the point where they pass through a fire-resisting wall. Service apparatus should be near an entrance accessible from a public highway.

The main supply and main circuits are to be controlled by metal-clad circuit-breakers with excess-current protection on each pole, or by linked switches and fuses. An exception is permitted where the main circuits are controlled from a metal-clad switchboard having bus-bars totally enclosed in a rigid metal case and arranged to incorporate direct control of each main circuit. In such cases a main switch or circuit-breaker need not be provided to control the bus-bar if other means of isolation are available and the switchboard is enclosed in a compartment that does not communicate with the auditorium.

Switch lampholders shall not be used and circuit switches must not be capable of being operated by the public. Unshrouded plug points must not be live after withdrawal, and every socket not forming a permanent part of the stage installation must be controlled by a switch immediately adjacent.

After December 31st, 1936, all wiring other than flexible conductors and connections for external signs shall be so enclosed as to prevent mechanical damage. Metallic enclosures are to have either screwed joints or clamped joints of equivalent conductivity. Wiring sheathed only in lead or rubber or contained within wood casing does not comply with this requirement. Flexible conductors should be protected, where necessary, against damage by tough rubber sheathing or flexible metallic tubing.

Battery Installations

Celluloid is not to be used for containers of accumulators. Connecting cables shall not be enclosed in metal conduits between accumulators and fuses or circuit-breakers; the latter shall be as near as possible to the terminals of the battery but not in the same room. The accumulators should be inspected at least once every three months and a discharge test at normal rate should be taken at least once every month.

No portable or open-element heater shall be used and the framework of heaters shall be fire-resisting. The lighting of buildings regularly used and seating over 275 persons shall be separate from other main circuits. Where the general lighting is derived from a multi-phase system, the safety lighting shall not be derived from any phase of the same supply except by way of accumulators.

Safety-lighting accumulators are to be fully charged before the first admission of the public on any day, and shall be capable of supplying the full load while the premises are open to the public, during which time accumulators shall not be charged. Where the accumulators are connected to both general and safety supplies, however, a three-hour capacity is enough, but in no circumstances should they discharge otherwise than to the safety circuits. Unless the battery has at least a six-hour capacity, the public must leave the building within one hour of a failure of the general supply.

An easily accessible main switch must be employed to control any exterior sign. An interior sign at more than 650 V must have its h.v. winding completely enclosed in a container of non-ignitable material. The energy dissipated at individual circuit dimmers must not exceed 0.5 kW.

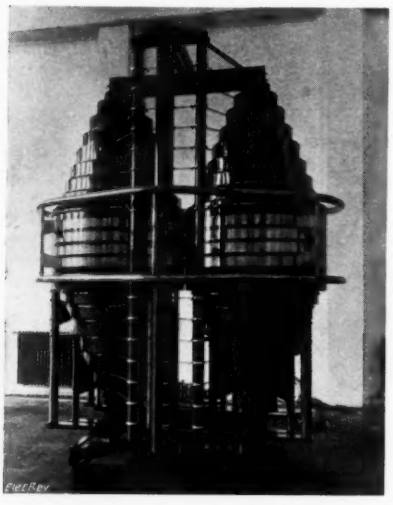
Safety in theatres was also the subject of a recent lecture at the Building Centre, New Bond Street, W.1, by Lt.-Col. Guy Symonds, Fire Advisor to the Home Office.

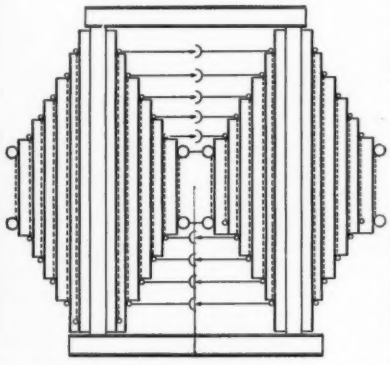
A Transformer Rectifier. By S. H. Hemsley, B.Sc., A.M.I.E.E.

Particulars of a type of plant of unusual design

HIGH voltage d.c. (up to 1,000 kV or more) is now frequently required for routine testing and various experimental purposes in a number of branches of the electrical industry, and also in specialised branches of physics. The most convenient method of obtaining this voltage is by a step-up transformer, excited from a low voltage a.c. supply (usually single phase), with its secondary winding connected to a hot-cathode valve or some form of mechanical rectifier.

The maximum voltage obtained by this means, using a single rectifier unit, is limited by the voltage that can be applied to the rectifier without flashover during the idle half cycle, and for simple half-wave rectification it will not exceed 300 kV. If the multiple circuit of Delon-Greinacher is used, this value may be increased to 600 kV.





Our illustration shows the 500-kV, 300-mA transformer rectifier unit described, and the accompanying diagram explains the arrangement of a unit of this kind, with a six-section winding

Pressures higher than 600 kV may be obtained by connecting several rectifiers in series, but since the capacity-conductance characteristics of each are different some form of potential divider, such as a series of condensers, must be connected across the rectifiers to maintain a more or less even distribution of back e.m.f. between the various units.

Installations of this type have certain obvious disadvantages. These have been overcome in a specially designed plant in which the h.v. transformer and the necessary number of rectifier units are built up as a single self-contained unit. The h.v. transformer is of the air-insulated type, and the unit illustrated on this page is suitable for supplying a d.c. voltage of 500 kV, with a maximum current output of 300 mA. A further unit of the same type, capable of giving 1,000 kV d.c., is in the course of construction.

The general practice in this country to date has been to design h.v. testing transformers almost exclusively as oil-insulated, naturally cooled units. On the other hand, Continental engineers have built a large number of h.v. air-insulated transformers of the Fischer type, which have been in satisfactory operation for a considerable time, and it is stated that the voltage obtained per unit can be made as high as with the oil-insulated type.

These transformers have been built for outputs up to 2,000 kVA without any form of artificial cooling. Further advantages claimed are: In case of breakdown, the danger from burning oil is obviated; the transformer is generally less liable to breakdown, due to the better control and distribution of the high-voltage field; and the weight and floor space taken up compare favourably with an oil-insulated transformer.

Construction of the Transformer

The h.v. transformer of the unit described here is of the single-phase type built by the Hochspannungs-Gesellschaft according to the design of Dr. Ing. K. Fischer. The h.v. winding consists of a number of concentric, single-layer, spiral coils wound on bakelised paper cylinders, the lengths of which decrease as the diameters increase. The ends of each layer terminate in metal rings suitably proportioned to prevent any discharge phenomena taking place, while over the outer winding (which is at the highest potential) four metal bands are arranged, also for protective purposes; two additional external rings surrounding both limbs serve as a further means of controlling the field.

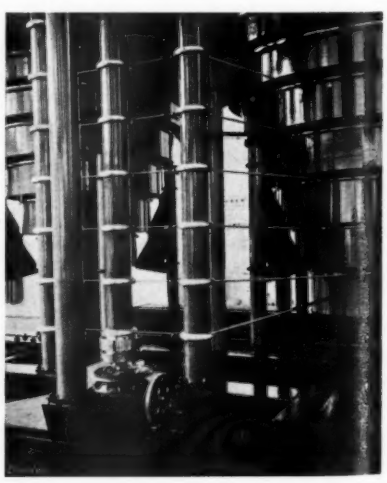
With such an arrangement of h.v. coils the capacity between the sections tends to distribute surges incident at the main terminals through the whole of the windings, instead of concentrating the stress at the end turns, so that the risk of breakdown is considerably reduced. For the same reason, special care is taken in insulating the l.v. winding both between turns and between windings and core, so that any induced surges may be effectively dissipated without earthing or damaging the primary winding. In a normal Fischer transformer all sections, with the exception of the two outer ones, are cross-connected in series by short straight leads; the two outer sections are connected in parallel, and the h.v. lead is taken directly from one of the rings.

Our illustrations give a general view and a diagram of the transformer rectifier unit in which the sections are connected in series through a number of rotating needle-gap rectifiers mounted on a common shaft, and driven by a small synchronous motor. The position of the motor stator is adjustable, which gives a direct variation of the d.c. voltage in addition to any control provided on the primary side of the transformer.

Simple and Robust

Two sets of fixed contacts are arranged for each double needle, so that the connections to the transformer coils are kept as short as possible. This type of mechanical rectifier is simple and robust in construction, and requires a minimum of attention in service. The voltage across each set of needles can be made comparatively small, with the result that no appreciable surges are introduced into the circuit, and the apparatus is almost noiseless in operation. The distribution of the total back e.m.f. between the several rectifiers can be controlled by the design of the capacities between sections of the transformer winding, and between sections and earth, which makes additional condensers unnecessary.

The unit has the further advantage of being easily converted for use as an ordinary h.v. testing transformer. In this case the needle-gap rectifiers are short-circuited or replaced by copper leads, the final h.v. lead being taken from the outside ring. The range of a.c. voltage available can also be varied, with full capacity output, by arranging the h.v. sections in parallel or series-parallel.



A "close-up" of the mechanical rectifier and driving gear

If the series-parallel connection introduces too many complications, certain sections may be used alone, and can be wound with heavier section copper for carrying the increased current. On the completion of the tests on a h.v. cable the cable can be discharged through the h.v. winding without danger of producing voltage surges; it is necessary to ensure that the primary winding of the transformer is first disconnected from the supply.

For surge testing, the capacity between sections is sufficiently large to store an appreciable amount of energy, although it is usually desirable to connect an additional condenser to the outgoing terminal in order to reduce the direct current voltage ripple.

This does away with the need for any elaborate system of discharge rods and resistances which are always somewhat cumbersome to handle and take up a considerable amount of sometimes valuable space.

Pensions and Compensation. By J. W. Thomas, Ll.B., B.Sc., A.M.I.E.E.

Schemes for mitigating the effects of unemployment

IN an interesting article which appeared recently in the New York *Electrical World* on "Reserves for Jobless and Aged," based on a paper which he had given before the Empire State Gas and Electric Association, Mr. H. C. Hasbrouck discussed the desirability of securing for employés in public utility undertakings, particularly gas and electricity, better provisions against the risks of unemployment and old age.

He referred to the feeling of insecurity existing amongst all classes of workers which is giving rise to a demand for some form of protection against these risks, and suggested that the only way to deal with it was by establishing by one means or another during periods of relative abundance reserves for times of need. Unemployment was a problem facing all industries and businesses, and whether industrial leaders believed that they ought to shoulder some or all of the cost of maintaining the unemployed or not the responsibility would sooner or later have to be assumed, if not voluntarily, then as a result of legislation. The light and power industries could not expect to evade their share of liability, and it was therefore very desirable that they should study and develop methods that would be most effective without imposing an unfair burden upon them as compared with other industries.

The first question to be considered was the division of cost, how much should be borne by the employé, how much by the employer, and how much by the State. In England it was shared by all three, though at present the largest proportion fell on the taxpayer. In the United States no system of compulsory unemployment reserves had yet been framed capable of carrying workers through more than a few months of unemployment at a much reduced standard of living.

If each industry were made to bear its own burden the electricity and gas industries, owing to their relative stability of employment, could build up sufficient reserves to do quite as well for their employés under any of the general schemes already proposed, and the author suggested that a separate plan for each company or undertaking could be worked out with due regard to the conditions of each. The primary aim should be that a large part of the cost of unemployment should be met by reserves built up during good times, the creation and maintenance of such reserves being recognised as a legitimate and necessary operating expense entering into the cost of production and, consequently, the price paid by the consumer.

Whilst this method might be feasible for public utility undertakings where employment does not fluctuate to any serious extent, it would be difficult to achieve in those industries which are subject to severe outside competition. For that reason the national system of unemployment insurance in this country has much to recommend it, as it enables the relatively prosperous industries to assist those that are hardly hit. The provision in this country against the risks of unemployment, however, is not as adequate as it might be, inasmuch as it excludes from its scope the technical and administrative staffs whose salaries exceed £250 per annum. The feeling of insecurity is probably more acute to-day amongst this class of worker than it is amongst the wage earners who have some protection, though perhaps a meagre one, under the Health and Unemployment Insurance schemes.

Causes of Unemployment

Unemployment may arise from the following causes: (1) Illness or incapacity due to accident, (2) rationalisation, (3) industrial depression, and (4) old age.

With regard to (1) the workers in this country are in a better position than those in the United States, where there is no general system of health insurance. But even in this country employés receiving over £250 per annum, unless voluntary contributors, are not included within the scheme, and therefore have no funds to fall back upon in case of absence due to sickness, apart from special arrangements which may be in force in the particular undertaking or company. So far as many electricity supply undertakings and large electrical manufacturing firms are concerned treatment during sickness is fairly generous, though cases are occasionally heard of in which men are deprived of their salaries after very few weeks of absence during sickness.

In the electricity supply industry there is no hard and fast rule as to the amount of sick-leave pay which should be granted, though efforts have been made to secure a uniform arrangement in the Conditions of Employment of the National Joint Board. The contention of the employers has usually been that the staffs are likely to be worse off under a rigid arrangement than they are at present, when each case can be considered on its merits. As regards those firms whose treatment of the staffs is niggardly there would appear to be no adequate solution except the extension of the present Health Insurance scheme so as to include employés who receive salaries higher than £250 per annum.

A recommendation has been made by the National Federation of Professional Workers to the Minister of Health that the salary limit should be increased to £500 per annum, and a promise has been obtained that the matter will be seriously considered.

"Rationalisation"

Whilst many people are agreed on the necessity of more planning in industry and a greater degree of co-ordination and control, they do not always realise that rationalisation usually involves displacement of personnel and that, unfortunately, sufficient regard is not always paid to those who are displaced.

An appreciable amount of unemployment has been caused in this country during the last few years in this way, and many cases of hardship have arisen. Men of considerable technical skill and experience have been displaced, and, owing to their age or to the limited amount of alternative employment available, have found themselves without work and without resources. There is only one equitable method of dealing with such displaced employés; that is, to compensate them. It is now a well-established principle that when rationalisation takes place at the instigation of the State compensation should be paid to those who are adversely affected. This principle was embodied in the Railways Act of 1921, the Electricity Acts, 1919-26, and the London Passenger Transport Act, 1933; but it is not as a rule recognised in private industry, except perhaps in the case of directors of companies.

When a concern is bought out by another company provision is usually made for the compensation of the old directors. There is no reason why a similar provision should not be made for employés who, by their loyal service and skill, have helped to build up an industry and ought not to be sacrificed without any consideration merely for the sake of increased profits. In fact, it may be laid down as a general principle that a scheme of rationalisation ought not to be embarked upon unless the savings to be effected are sufficient to make an adequate provision for those who are adversely affected. Under the Electricity (Supply) Acts an electricity undertaking is entitled to take into account, when comparing its costs of production with those of the Central Board, the amount which would have to be paid by way of compensation if it was made to take a supply from the Board and shut down its own generating station.

An endeavour was made in 1930 to obtain legislation making compensation payable to employés displaced by schemes of rationalisation. A private member's Bill was introduced by Mr. Lathan, but, unfortunately, lack of Parliamentary time prevented it from being considered.

Industrial Depression

Displacements caused by industrial depression are on a somewhat different footing from those caused by schemes of rationalisation because they are usually due to circumstances over which the employer has little or no control, and they take place at a time when the business is least able to afford to allocate any funds for this purpose. The obvious remedy is a system of insurance whereby provision is made in the good years for bad times.

This is the principle which underlies the unemployment insurance scheme in this country, but it does not cover employés receiving more than £250 per annum. Yet these people are just as likely to be victims of industrial depression as the lower-paid workers, and in many cases they stand in just as much need of some system of insurance. Protection against the risks of unemployment in respect of those in receipt of £250 per annum might be borne, as Mr. Hasbrouck suggested, by each industry or undertaking, but it is doubtful whether it could be made at the present time on account of the existing abnormal circumstances.

The other method is to extend the national system so as to cover these higher-paid workers. The additional burden on the State scheme would not be excessive because the percentage of unemployment amongst these employés, though serious, is not so high as in the case of lower-paid workers. The contributions to the scheme might remain as at present, and also the benefits. Although the latter would be small

in comparison with earnings, they would prove of some assistance to men whose only other alternative at present is to fall back on their meagre savings or on public assistance. Unemployment insurance arrangements in Canada cover non-manual workers receiving up to £400 per annum.

Old Age

Mr. Hasbrouck discussed the insecurity arising from old age and set out some of the familiar arguments in favour of pension and superannuation schemes being instituted. There can be no doubt that the dread of old age and probable consequential unemployment weighs on many employés, and, if only to remove that dread, industrial concerns should be urged to institute superannuation or pension schemes for those they employ.

It is not only upon humanitarian grounds, however, but also on purely economic grounds, that a strong case can be made in support of them. As Mr. Hasbrouck stated, large industrial undertakings already pay concealed pensions to keep long-service employés on their staffs after their usefulness has seriously diminished or even ended. When a pension scheme is instituted the pay roll can be relieved from carrying such employés. Some employers, in order to avoid retaining long-service employés, retire them on an *ex-gratia* allowance, for which no special fund has been instituted nor contributions paid. This is not altogether a satisfactory arrangement from an employé's point of view as he cannot but feel that such an allowance is granted to him as a matter of benevolence rather than of right. It is also unsatisfactory from the employer's point of view, inasmuch as it may constitute a heavy burden upon a business if the number of these long-service employés increases.

It is far better to have a definite scheme which is actuarily sound and will give a sense of security both to employer and employé alike. Many electricity companies have realised the force of this and have instituted pension schemes for their employés. In some of these schemes the employés are not called upon to make any contribution, the fund being maintained entirely by the company. These have the disadvantage of making the employé feel that the pension is a voluntary affair and not one under which he has a right by virtue of having contributed to it.

The general type of pension scheme to-day is based on joint contributions, thus giving to an employé the right to a pension when the appropriate time arrives or to the return of his contributions, with or without interest, if he leaves the service before the age of retirement is reached. It is this type of scheme which applies to local government officials under the Superannuation Act, 1922.

The National Industrial Alliance has recently issued a report on the provision of pension schemes for clerical, administrative, supervisory and technical employés in industrial enterprises. It contains a number of recommendations based on the consideration of various schemes in operation, and it concludes with the opinion that pension schemes do a great deal towards relieving the anxiety of workers during their periods of service, and therefore tend to make them more efficient from the economic standpoint. The report definitely recommends that pension schemes should be contributory, and should not impose upon the members conditions restricting their personal liberty of action.

In conclusion, one may venture to agree with the final opinion expressed by Mr. Hasbrouck, that charges to create reserve funds for mitigating the risks of unemployment and superannuation will soon be recognised not only as legitimate, but as absolutely necessary, elements in the costs of public service just as the cost of compensation for industrial accidents is now universally recognised.

A Lamp-spraying Installation

AFTER viewing the lamp-spraying plant and operations at the premises of Beeantee Illuminations, Ltd., we feel convinced that there should be no difficulty in getting very large quantities of lamps, such as will probably be required in connection with this year's Jubilee Celebrations, colour sprayed.

The actual spraying equipment, consisting of single hand " guns " served by an air compressor and discharging into the receivers of a power-driven ventilating system, appears to be standard. It is similar to many installations that we have seen in all kinds of spraying in electrical manufacturers' work-shops, and the operations, which no doubt require experience for speed and efficiency, are simple in character.

Left: Dipping and drying. Centre: Individual " gun " spraying. Right: Sorting and packing

After being unpacked the lamps are dipped in an acid solution for cleansing and are polished. The cap of each lamp is then inserted in a central hole in a small cardboard shield which protects the metal from the spray. Holding the cap in one hand and revolving the lamp in a way dictated by experience, the operator plays his " gun " on the bulb. Beeantee claim that this individual spraying is the only really reliable method of ensuring completely satisfactory results.

Secured in special cap clips on battens, the lamps are then oven dried at 160 deg. C., after which they are dipped in a colour fixing and weather-proofing solution. After dipping the lamps in luke-warm water to remove the fixing solution, and giving them another drying operation, they are ready for re-packing. There are eleven operations in the whole process, and although the lamps are actually sprayed singly, they are dealt with in batches of fifty. But obviously the process could be made continuous and the number of guns in use at one time varied according to demands.

About 200 lamps can be dealt with per hour per gun. The above refers to standard treatment, and although the resultant colouring is weatherproof, will not crack or peel, and has a normal life of about two summer seasons, the company has its own special after treatment which will extend the life of the colour and enable it to stand up to particularly severe atmospheric conditions. The installation also includes paint mixing and grinding plant; the colour is mixed to the company's own specification. We also witnessed lamp-frosting operations, and were interested in a lamp re-capping machine which enables lamps in stock with the wrong type of caps to be used to meet urgent orders. There was evidence of considerable Jubilee activity in the spraying shops at the time of our visit.

Electric Locks in France

A new lock, 721 ft. in length, has recently been completed on the River Seine at Amfreville, between Paris and Rouen. The lock gates and sluice valves are entirely electrically operated, the installation comprising a 20-kW motor for the upper gate, one of 40-kW for the lower gate, and one of 14-kW for the sluice valves. There are also six electrical capstans situated along the sides of the lock, each being operated by a 14-kW motor through a friction clutch.

French Domestic Equipment

Some interesting electrical designs seen at a Paris salon

A DOMESTIC electrical appliance for each hour of the day was the keynote of the display by the distribution companies in the Paris region at this year's Salon des Arts Ménagers, held in Paris, where there were also several other features to excite comment. Perhaps more than anything else the exhibition gave evidence of the efforts made by manufacturers to bring labour-saving devices within the reach of modest incomes. For instance, there was a vacuum cleaner priced at 550 fr.; two or three years ago this type of cleaner was sold for more than double that amount.

The salon was divided into three sections, namely, cooking ranges, refrigerators and vacuum cleaners. Apart from these articles there were the usual ingenious devices which are to be seen each year, but the French public has no money for such things; only really useful articles are bought.

Utility takes first place in the estimation of the French housewife; but this photograph of the Paris distribution companies' stand shows that the value of pleasing appearance is also recognised

Among the cooking ranges the De Deitrich model attracted considerable interest. This firm has only just commenced manufacturing electric cookers, and has come into the business with quite fresh ideas. Each oven contains two heating elements, a covered one in the base and the other uncovered at the top. The elements are long ribbon-like bodies and are not wound round a core, which means that the heat radiates from the whole surface. At the moment the regulator of the oven is for a.c. only, but it is proposed shortly to introduce one suitable for both a.c. and d.c. The frame of the range is in angle iron and sheet steel to prevent warping. All the connections are in hard drawn bare copper wire, insulated from the mass by steatite. The terminal screws are designed so that the wire cannot possibly become detached.

At the salon one expects to see numerous American refrigerators, but American cookers are not often shown. One of the most successful this year was the Norge. This type of range has special burners which heat rapidly and therefore cook more rapidly. The whole range is constructed on labour-saving lines and contains drawers for warming dishes and plates. The oven has an insulation which ensures an even temperature. There is also a special grill situated below the oven the heating element of which also heats the oven.

The De Deitrich cooker

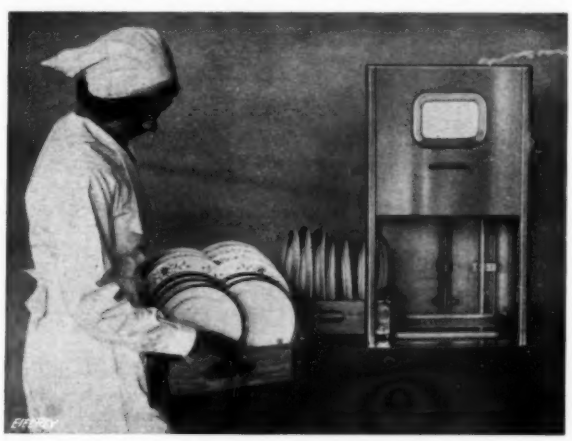
The Stella ranges exhibited have many interesting features. All the connections, for example, are on a plate forming the top of the range; this can be raised and lowered, thus making the connections easily accessible. The top can also be removed for cleaning without exposing the wires. At the back there is a six-pole connection box. The heating elements can be plugged in as with an ordinary plug and socket and thus may be easily removed for repair or replacement.

The refrigeration section contained little really new. The most interesting apparatus was the "Crosley," the door of which has internal shelves. At the bottom of the door there is a kind of basket for storing vegetables, and this section is not cooled. With this refrigerator all the available space is utilised. The apparatus has a suspended motor, and the whole motor unit can be easily removed if necessary. There is a lamp inside the refrigerator which is switched on automatically when the door is opened. A few French refrigerators were to be seen. These do not seem to have been very much improved and usually they do not include a motor. The comparatively reasonable price of this type of refrigerator, however, helps the manufacturers to do good business.

The keenest demand seemed to be for vacuum cleaners, probably on account of the fact that these are now much cheaper. The prices of the majority of cleaners exhibited range from about 500 to 600 fr. In this section a number of improvements in design were to be seen. A special box placed at the end of one cleaner contains crystals, which are vaporised by air forced out through the box; this vapour is a disinfecting agent and insecticide.

A number of machines had "floating motors" with double aerodynamic turbines, while one or two cleaners had two-speed motors. In most a device was incorporated to avoid interference with radio receivers. The Sev "Elite," one of the cheapest machines at the salon, is built in a non-vibrating material with a suspended motor. Its suction capacity is 25 cu. ft. of air per minute.

For the first time small portable vacuum cleaners were numerous. As they take up little room and are easily used in a confined space they appear to be gaining in popularity. Tecalemit featured a portable cleaner which can be used for cleaning automobile cushions.



A domestic dish washer

Apparatus such as dish-washing machines is more suitable for restaurants than for the home. Bolinder, however, showed a washer which, despite its smallness, can deal with 1,000 plates per hour. Its rating is about 700 W and it possesses a 0.5 h.p. motor.

There were quite a number of clothes washers to be seen. The main idea of most of these is space-saving, and the mechanism is generally built into the machine, which also avoids the danger of anything getting caught in the machinery. In the Etoile machine washing is by three suction cups which move up or down, thus forcing first air and then soapy water through the clothes.

Radiators with new "Calrod" heating elements were exhibited by Als-Thom. These elements are formed by putting the heating coil, in nickel chrome, into a stainless steel tube from which it is insulated by powdered magnesia.

Condensing Problems. By R. Wright

How to keep the tubes clean

WHEN river water is used for condensing considerable trouble may be encountered during the autumn due to leaves. However good the screening plant may be a certain percentage of the smaller leaves finds its way into the condenser, where, with grass or small twigs, they lodge over the tube ends.

I have had to shut down plant for leaf removal as often as once in twenty-four hours. This was a serious matter, not only because of the extra expense incurred in changing over and cleaning, but also from an efficiency standpoint, as there was a gradual loss of vacuum for a few hours prior to shutting down.

A scheme was therefore devised for cleaning the condensers,

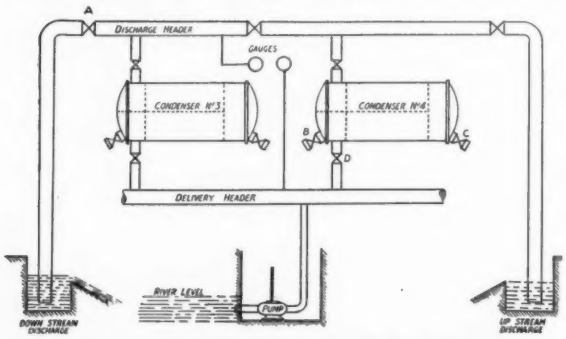


Fig. 1.—Diagrammatic arrangement of the plant

and since its inception, about two years ago, the plant has not once been taken off the bars for this purpose, as the condensers can be flushed out with two-thirds load on the machine.

The Remedy

Two additional valves have been fitted, low down, to each condenser end shield, one at the inlet and the other at the intermediate end which, when open, allows water to pass from the condenser on to the basement floor.

Two pressure gauges have been installed close together and connected to the pressure and discharge headers. The valve in the latter near the upstream discharge is normally closed, the circulating water being discharged below the circulating pump suction, except during very severe frosts when a slight discharge upstream keeps the screening plant clear of ice.

If condenser No. 4 is on load, and requires flushing, circulating water is put through No. 3 and main discharge-header valve A (fig. 1) is gradually closed until the pressure on the discharge header is brought up to about 3 lb. lower than that on the pressure header (if this is not done the delivery valve to the condenser cannot be re-opened, owing to the pressure head on its underside). This cuts down the flow of water through the condenser, although some flow is still maintained by the 3 lb. pressure difference.

Valve B is now opened and valve D closed; this reverses the flow of circulating water through the condenser thus washing out the leaves adhering to the inlet ends of the tubes. Valve C is opened and valve B closed, this action disposing of the leaves at the intermediate end of the condenser, after which valve D is opened, and C closed. Water can then be shut off No. 3 condenser, and normal condition restored. The flushing valves being fitted to the end shields of the condenser as low down as possible, do not form a trap for leaves.

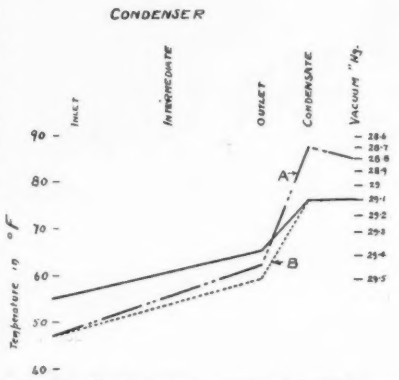


Fig. 2.—Performance curves of a condenser

Only a slight loss of vacuum occurs due to the restricted flow of water through the condenser, but the strictest attention must be paid to the balancing of the pressures, or trouble will result. In summer (and even during a mild winter) a vegetable growth clings to the circulating water side of the tubes, some waters being more conducive to its development than others, and the valves B and C can be used to advantage to counteract it.

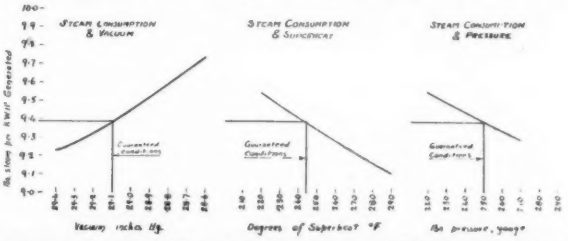
I am using fine ashes (below ¼ in.) for scrubbing the tubes internally. The suction of a 3-in. sludge pump with a Stype impeller is connected to a tank into which ashes and water are discharged. The delivery side of the pump is connected to valve B while the condenser is in commission, and the ashes are pumped through. Heavy particles remain at the ends of the condenser and can be finally disposed of by flushing.

Silting will take place only if the pipe is too large for the quantity of water passing, but after a maximum depth the velocity of the water will prevent further deposition.

Efficiency Losses

In the accompanying performance curves of a condenser (fig. 2) the full time graph indicates the guaranteed results with a circulating water inlet temperature of 55 deg. F. and a vacuum of 29.1 inches. The chain graph A shows the conditions at the same loading with an inlet temperature of 47 deg. F., under which condition the vacuum should have been higher than 29.1 in. instead of which only 28.8 in. was obtained. This was entirely due to slime or vegetable growth on the circulating water side of the condenser tubes. After passing ashes through the condenser for a few hours graph B was obtained, showing a reduction in the circulating water temperature across the condenser of 3 deg. F. and an increase in the vacuum of 0.3 in. Hg.

The difference this makes to running efficiency is shown in fig. 3, which is based upon standard steam pressure and temperature. With a vacuum of 29.1 in. the steam consumption is 9.39 lb. per kWh generated. With a vacuum of 28.8 in. the steam consumption is increased almost to 9.6, a difference of 0.21 lb. of steam per kWh, which with an output of 15,000 kWh for eight hours gives an extra steam consumption of 15,000×0.21×8=25,200 lb. Taking the evaporation as 6.9 lb. of water



Figs. 3, 4 and 5 (left to right).—Graphs showing how efficiency is lessened under certain conditions

per lb. of fuel an extra consumption of 25,200/6.9=3,652 lb. of coal per eight-hour shift results.

With guaranteed vacuum the coal consumption of the set on full load is 163,304 lb. for an eight-hour shift, and the increased fuel consumption due to a loss of 0.3 in. of vacuum amounts to 3,652/163,304=2¼ per cent.

Prior to the fitting of flushing valves to the condenser I have seen the vacuum down almost 2 in. below standard due to leaf accumulation. The loss of 2¼ per cent. can be further increased if the standard temperature and pressure conditions are not maintained (figs. 4 and 5).

If the superheater temperature drops by 24 deg. F. to 220 the steam consumption of the set increases from 9.39 to 9.54 lb. per kWh, and if the steam pressure drops by 20 lb. per sq. in. gauge the consumption of steam would be increased from 9.39 to 9.49 lb. per kWh. It is possible for these three conditions to obtain at the same time, which would increase the consumption of the set from 9.39 to 9.85 lb. per kWh generated. At a load of 15,000 kW this would mean an extra demand of 6,900 lb. of steam per hour or an increased coal consumption of (6,900×8)/6.9=8,000 lb., or 4.9 per cent.

To maintain proper steaming conditions the boiler steam pressure should be higher than the turbo designed pressure by at least the steam range drop. For example, if a turbo-alternator is designed for 300 lb. gauge pressure and the range drop between the boilers and turbine is 20 lb. with overload conditions on the machine, then the normal steaming pressure of the boilers should be 320 lb., and the blow-off pressure of the boilers in the neighbourhood of 340 to 350 lb. This obviates a slightly lower efficiency of the turbine on the heavier loads due to pressure drop across the steam range, at the same time reducing boiler blow-off losses and minimising safety valve repairs.

A Large Telephone Factory

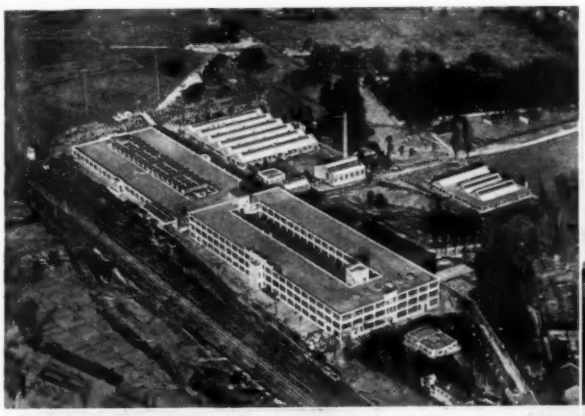
The Standard Works at New Southgate

THOSE enthusiasts who twelve years ago sat up all night at the New Southgate factory of Standard Telephones & Cables, Ltd., to listen to the first demonstration of transatlantic telephony*, one-way radio speech only in those days, will hardly recognise the works to-day.

A tour last week of the premises, which are planned for an ultimate productive floor area of a million square feet, revealed how they have grown. At present the total floor space utilised is 365,000 sq. ft., and the number of employés is 3,300.

The factory is beside the main L. & N.E. Railway, about six miles from King's Cross, and is close to the Great North Road and to the North Circular Road. The site, of about thirty-five acres, is roughly L-shaped in plan and is divided in strips, each 180 ft. wide by 440 ft. long, with intersecting roads 50 ft. wide.

There is accommodation for five main blocks of these dimensions without encroachment on recreation fields at the two extremities of the site. Three of these strips are already occupied by buildings, the main factory blocks being three-storey



The Standard Telephone Works, New Southgate

1. An aerial view. 2. The main office entrance, Building 3. 3. Looking south-east from the upper field. 4. The hospital building

reinforced concrete structures with flat roofs. The longitudinal centre strip of the ground floor is covered with a north light type roof, while the upper floors are divided along the greater length into shops 60 ft. wide with a central light well of the same width.

The area of the ground floor is approximately 80,000 sq. ft and that of each upper floor 60,000 sq. ft. The main buildings are provided with stair wells at each end and at the centre of each long bay. At present one three-storey block and the ground floor of the second similar block are fully completed, while work has commenced on the addition of some 35,000 sq. ft. to form a part of the second storey of the second building.

A third group of buildings of the single-storey type includes an extensive woodworking shop built of steel and brick with a saw-tooth roof. An open bay at one end is utilised for packing case manufacture, and there is a concrete platform beyond this for lumber storage. Nearby is a garage and accommodation for the service and maintenance staff, together with junk-handling store and inflammable materials store, and the boiler house.

These service buildings occupy a central position, and advantage has been taken of the sloping site to facilitate factory rubbish being wheeled on floor level and tipped into a destructor on the boiler house floor below, to which wood refuse from the cabinet making shop is also conveyed direct. Fuel is transported from a pit on the railway siding by an underground conveyor right across the factory site to elevated hoppers in the boiler house which, in turn, feed the automatic stokers.

The works canteen with fully equipped kitchens faces the lower playing field. It is a single-storey building of approximately 13,000 sq. ft. and provides seating accommodation for 1,000 persons at a time. An outlying wooden building is reserved for special testing which necessitates freedom from electrical interference that might be experienced in the main buildings.

The activities of the New Southgate factory cover the manufacture of telephones and exchange equipment, as well as radio apparatus, the manufacture of transmission equipment, valves, and cables being allocated to the company's Woolwich works.

The machine shop and tool room are on the ground floor and the assembly shops are on the first, with offices on the second floor. The receiving department is at one extremity of the block with the raw materials inspection section and stores adjoining, the latter being in the centre of the ground floor, the whole of one side of which is occupied by machine tools.

The products go to a metal-finishing department in one corner, whence the components are taken into the piece part stores in the centre, which in turn feeds upwards to the first floor on one side of the building. On the next level the assembly of telephone apparatus and exchange equipment progresses clockwise right round the entire first floor, reaching the extremity on completion.

The shipping department adjoins the railway on the outer side of the block. In order to collect the products of the two main factory buildings and, at the same time, to provide adequate means of handling packed merchandise in and out of

* See Elec. Rev., January 19th, pp. 83 and 90; also March 2nd, p. 356, 1923.

MEETINGS AND DISCUSSIONS

Current Topics and Opinions Expressed at the Institutions

Private Plant and Public-supply Tariffs

THE relative costs of producing power in various ways for normal requirements up to 500 kW are compared in the paper by Mr. J. A. Sumner which was read before the INSTITUTION OF ELECTRICAL ENGINEERS in London on February 28th. It represents an investigation in the area of a semi-rural supply undertaking and a more generalised study of Diesel engines and "pass-out" steam turbines, these being the most efficient forms of private plant.

The second part of the paper is an analysis of the costs of providing electricity from public-supply undertakings. An attempt is made to classify and define types of authorised areas, and to generalise on the possibility of standardising public-supply costs.

The effect of the fixed charges is to increase the cost per kWh at low load factors more rapidly when Diesel plant is installed than when a public supply is taken. The miscellaneous private plant in use in the detailed area becomes relatively cheaper to run at the lower load factors. This is because of the low fixed charges which prevail owing to the majority of the plant having been in use for a number of years, but these reduced fixed charges are neutralised by the higher running costs. As the pass-out steam turbine is a particular case of use it is not possible to make a comparison with public-supply costs in the same manner as for the more generalised costs of Diesel plant. Certain items which are not financially computable would appear to favour the public supply to a still greater degree.

Comparative Costs

The conclusions reached are that an efficient public-supply undertaking can supply untransformed h.v. power at a less cost than that at which the power can be generated by any modern form of prime-mover installed on consumers' premises; the public-supply cost is also more likely to decrease in the future. An exception may arise if a factory requires steam primarily for process work and secondarily for power production, and if the process requirements are coincident in time.

The average public-supply tariff which will enable power to be obtained as economically (at high voltage) as it could be generated by means of a Diesel engine, is estimated to be £4.95 per kW of maximum demand (30-minute average) and 0.4d. per kWh for large plant, rising to £6.6 per kW of maximum demand+0.53d. per kWh where smaller plant is installed. The cost of power generated by small residential plants exceeds the cost at which power is available from an efficient and modern public-supply undertaking.

The annual load factor is the main feature which determines the cost per kWh of power required. The comparison has been based only upon the computable financial items and takes no account of certain other advantages which are peculiar to the public supply.

There is a belief that electricity can be obtained from privately installed Diesel plant at ½d. per kWh, but so far the author has not found an actual instance where generation is being carried out at this figure when all the real cost components are taken into account.

It is suggested, first, that the capital expenditure required to give supply to a consumer is the same for all types of areas of equal development. As there is no great difference between areas in the characteristics of the domestic and general low-voltage demands, the cost of giving supply should depend only upon the stage of development of the undertaking and, to a far less degree, upon the nature of the system load. The effect of obtaining a power load is, however, to improve the load characteristics of the undertaking and to reduce the average price at which electricity can be sold, and it is reasonable to expect that urban undertakings, which generally have a large power demand, will have lower charges for all purposes than rural undertakings.

A study of the tariffs which prevail throughout the country shows that many undertakings are selling electricity for power purposes at a lower rate than is required to compete with the *real costs* of running private plant, and in most of these cases the domestic consumers are not receiving the benefit of the reduced tariffs which are justified because of the reduction in overall costs brought about by the power load.

Tariff Standardisation

Although it is outside the scope of the paper to attempt to formulate detailed tariffs, the author is definitely of the opinion that it would be financially possible to achieve an approach to one tariff, common to all undertakings throughout the country, provided some co-ordination were obtained between undertakings. By merging areas in this way it is probable that the cost per kWh supplied by any undertaking would not exceed 1d. and in many cases would be as low as 0.7d. Is it not possible that the method of charging of the future may involve a return to the "flat rate" and that all consumers, both power and domestic, may be charged one basic price, with reductions for off-peak loads, etc., *i.e.*, the average cost, to the undertaking, per kWh supplied for all purposes?

After a careful effort is made to study the manner in which an improvement in diversity or system load factor can cause reductions in tariffs, it does not seem unreasonable to forecast that electricity will be available within the next few years to all consumers at a rate of 0.5d. per kWh.

By merging electricity areas into much larger single districts the inevitable deficit of a newly developed area can be balanced against the surplus from the older areas and a uniform tariff can be kept throughout the single large administrative district.

With a standard tariff, combined with suitable publicity, there would be an immediate large increase in the sales of electricity and in the number of connected consumers.

Rural Districts

It is probably not realised sufficiently to what an extent the obtaining of a power load can reduce public supply electricity costs, due to improvement in the system load factor and the reduction in costs per kWh sold. A further point which may require some emphasis is that power loads are not confined to the urban areas, but that there is a large potential load existing in the rural and semi-rural districts for such purposes as water-pumping, farm loads, etc., quite apart from those power requirements which may be indigenous to rural areas, *e.g.*, for quarries, cement works, and coal and local mineral mining. It would seem that economic conditions such as heavy urban taxation and the desire for improved hygienic conditions of working may cause industrial plants to be moved from the towns to the rural areas. Several instances of this nature have occurred in the area considered in the paper, which shows how a power load in a semi-rural area can accelerate development and the reduction of costs.

The terms "urban" and "rural" are applied to distinguish between areas with a dense population (exceeding 10,000 per square mile) where underground cables are used almost exclusively, and those comprising rural and urban (administrative) districts with a population density of about 200 per square mile.

It is not generally realised that the rural scheme as defined above can very often afford to supply electricity at rates which compare favourably with those prevailing in the urban areas, if equally developed, owing to the reduced cost per mile of electrification which is possible by the use of overhead lines and the avoidance of heavy reinstatement charges, &c., compensating for the reduced load density in the rural areas. Further advantages occur, in that the competition of the gas industry is often absent or negligible, and also that a considerable power load may be developed.

The real distinction between rural and urban areas is shown

A Large Telephone Factory (*continued from previous page*)

trucks, railway wagons, and the warehouse, a combined travelling gantry and elevator with a lifting capacity of three tons is installed.

At one end of the middle floor of the three-storey block is a small suite of administrative offices. Along one side on the same floor are the engineering, production, and planning staffs with laboratories interposed where required. These office arrangements house the staff in logical order to ensure good mutual contact, the comptroller's staff being accordingly the last link in the chain at the far end from the administrative office, with printing facilities and stationery stores nearby.

On both sides of the well-tended entrance drive clipped hedges and shrubbery screen accommodation for several hundred cycles on the one hand, and on the other a beautifully kept hospital and employment building of modern brick construction, the disposition of which enables applicants for work to be interviewed and registered without entering any part of the main factory premises.

in a "population per square mile" table, the most interesting feature of which is the fairly constant value of the "capital expenditure per dwelling on route of mains," from which it would appear that there is a real reason for assuming that the electrification of rural areas is not necessarily more expensive than distribution in urban areas, at least up to a 70 per cent. development in the rural area. It is unlikely that more than 75 per cent. of the rural population can be economically supplied under the present system of distribution financing.

However, less than 20 per cent. of the population of England lives outside the urban areas (municipal boroughs and urban districts) and the rural area in which this small percentage of the population dwells comprises more than 90 per cent. of the whole country. The economic limit of development occurs in rural areas when approximately 70 per cent. of the dwellings in the area have a supply available, as compared with 80-90 per cent. in urban areas.

The distinction between rural and urban undertakings is not in the financial results which are ultimately achieved. The difference is in the relatively heavier and temporarily unremunerative expenditure which a rural undertaking must carry out in the initial stages, with the possible consequence of a greater accumulated deficit before financial equilibrium is obtained.

The policy of high prices and small sales is never justified in the later stages of development of any undertaking, but it is almost inevitable in the initial stages of a rural undertaking so long as the financial results of each undertaking are kept separate. The heavy accumulated deficit which is shown to have occurred during the first four years in the rural undertaking surveyed in the paper is a deterrent to the executive recommending tariff reductions. In the subsequent consideration of the cost of supply in rural and urban areas, therefore, this fact should be kept in mind.

Ireland's Two Electricity Schemes

MR. C. R. WESTLAKE presented his paper on "Electrical Development in Northern Ireland" (which was summarised in our January 25th issue) at the Dublin Centre of the INSTITUTION OF ELECTRICAL ENGINEERS on February 21st. His easy and witty manner put him on excellent terms with his audience (which included the chairman of the Free State Electricity Supply Board), most of whom were astonished by his remarkable tale of progress.

Two speakers seemed to think that the Northern Ireland undertaking scored over the I.F.S. system by not having to pay capital charges on generating stations, forgetting that these charges form part of the cost of bulk supply. Actually, of course, the N.I. undertaking is in a worse position than the other because the cities of Belfast and Londonderry are excluded from its area; Dublin and the other large towns form 70 or 80 per cent. of the Southern market.

One speaker said that twenty years ago he found many of the best authorities anticipating the approach of saturation of demand, but it seemed to him that such an event was receding rather than becoming more imminent. Mr. Westlake was able to show that in using the word he referred to an approach to a one hundred per cent. connection of the possible consumers in a given district. A glance at the almost vertical lines in some of the graphs thrown on the screen certainly dispelled any idea of saturation in the demand for electricity troubling the mind of the Board for a very considerable time.

While one speaker thought that the majority of consumers in a rural area could not possibly afford more than 2s. to 3s. a week for all cooking and heating, another believed that as time went on there would be more and more money made available for reducing household drudgery. The standard of living undoubtedly was rising, and electricity played an increasingly important part. A leading contractor seized upon the remark that the Northern Ireland Board had not yet exercised its statutory right to act as a wiring contractor, and that in consequence cordial relations existed between the Board and contractors, to point out that such co-operation was entirely lacking in the Free State, and that, in his opinion, the definite antagonism existing between the Supply Board and the contractors had retarded the sale of energy.

In reply to questions Mr. Westlake said that the sinking fund or depreciation charges were based upon an all-over period of nineteen years, which made the charges higher than they should be. The rate of interest mentioned in the paper was purely an arbitrary figure, as these rates were varying continually. He found the cost of tapping a 33-kV line to be about £70. Many of the statistics printed in the paper were already out of date, and the figures estimated for 1934-35 were not sufficiently optimistic. The annual load factor had fallen slightly due to the increased maximum demand.

Glass-bulb Rectifiers

AT the meeting of the London Local Technical Group of the ELECTRICAL POWER ENGINEERS' ASSOCIATION on February 18th Mr. A. M. Brown, of the Hewittic Electric Co., Ltd., outlined present-day practice with glass-bulb rectifiers. He said that at the present time glass rectifier bulbs were being made up to individual capacities of 500 A at 500 V, or 250 kW. These ratings allowed for 25 per cent. overload for two hours and momentary overloads of two-thirds full load. The actual bulbs generally employed for normal distribution at up to 500 V were equally suitable for 600, 1,500 or 3,000 V d.c., as required for traction work.

From 1910 to 1922 most of the rectifiers supplied were for battery charging or cinema projectors needing a d.c. output at about 100 V and also for lift service at about 220 V and sometimes 440 V. From 1922 onwards the largest proportion of equipments supplied was arranged for 220 and 440 V, or 250 and 500 V, to feed three-wire d.c. networks and also 550/600 V d.c. to feed tramway systems. In 1933 the first glass-bulb equipments were installed in this country for use at 1,200 and 1,500 V d.c. on the Manchester-Bury electrified railway line. Last year the first glass-bulb equipment for high voltage (10,000 V d.c.) was installed in this country for the G.P.O. at the Rugby radio station. Single bulbs could now be made for service at up to 20,000 V d.c., and experiments were being carried out to make bulbs suitable for 50,000 V d.c.

By 1929 the largest sub-station fitted with this equipment had a capacity of 6,000 kW, i.e., operating off a common transformer. Indeed, glass bulbs could be banked with success in any numbers, although the larger capacities of the units made it possible to bank a smaller number for a given output, which in certain circumstances was more economical. About 300,000 kW of glass-bulb rectifiers was now installed in this country, and light and power distribution was the largest field of operation.

Since 1928 rocking of the bulbs for starting had been generally discontinued in favour of flexible electrodes controlled by an externally placed magnet, or bi-metal electrodes, or the pinch method of starting. Recent methods were simpler and less costly.

Voltage Control

For voltage control at first the usual practice was to have a tapped auto-transformer with step switch fitted to each rectifier for controlling the low-voltage a.c. input to the bulb, but as the capacity increased induction regulators could be used. More recently on-load tap-changing gear had been developed for rectifier transformers. Within the last few years grid control had been adopted for about 10,000 kW of rectifiers now in service in this country.

This illustration of a corner of the erecting shop of Messrs. Hopkinsons, Ltd., shows a group of turbine stop valves for the Fulham & Battersea power stations. In the background is a 2,000 lb. per sq. in. test boiler

On the Continent motor-driven contact makers were used for this purpose, but static control was the general practice in this country to-day for banks of two, three, four, six and sixteen bulbs in parallel.

Discussion

In reply to Mr. D. A. S. Porteous, chairman, the author stated that he regarded the rotary convertor as dead. The steel-tank rectifier had been used with fair success for traction work, but it had never compared well for lighting and power in comparison with the glass-bulb rectifier. Apart from its greater cost the steel-tank rectifier needed very cumbersome control gear.

Mr. A. G. Hilling remarked that while glass was more fragile than steel, the glass-bulb units were smaller so that in case of accident there was not the same risk to the supply. The author said that the power factor without grid control was 0.94 at full load down to 0.90 at quarter load for a six-phase connected equipment, taking into account transformers and auxiliary gear. For a twelve-phase equipment the figures were from 0.94 to 0.95 and from 0.90 to 0.91 respectively. With grid control the power factor varied proportionately downward, and at lower pressures there was undoubtedly a bad power factor and bad wave form distortion, although he did not see any reason for visible flicker.

Mr. B. Wood informed the meeting that at the present time there were in use about 250,000 kW of steel-tank rectifiers. Backfires were almost unknown and this type required practically no attention. The "mutator" also acted as an invertor, and large numbers had been installed for up to 30,000 V. Such apparatus had been supplied to Germany and South Africa and also for the Italian State Railways. The author maintained that the steel-tank rectifiers sent to South Africa and to the Italian State Railways were satisfactory, but the invertors were not. Of course, there was nothing to anybody's discredit in that.

Mr. J. Lister suggested it should be recognised that there was a field for both types. For electrolytic work he regarded the steel-tank rectifier, the London Passenger Transport of glass bulbs which would have to be used for, say, 30,000 A. Taking a life of 16,000 hours, or two years, this meant a heavy expenditure for renewals, as the units cost from £80 to £100 each. Moreover, if there was not something to be said for the steel-tank rectifiers, the London Passenger Transport Board would not have adopted it. The author agreed that there was a case for the steel-tank rectifier for electrolytic work. A life of two years, however, was hardly in accordance with the facts, because the insurance companies insured glass bulbs for something like 4 per cent. for the first six years and charged a slightly larger premium for the following five years. The London Passenger Transport Board had recently ordered ten glass-bulb equipments for sub-stations of from 500 to 1,000-kW capacity.

Mr. G. M. S. Sichel challenged the author's statement that the rotary convertor was dead, and claimed that for high voltage operation it gave an effective and efficient and trouble-free service. The author said that he had not intended to cast any aspersions upon the modern rotary convertor, because some were working extremely well, but the fact remained that manufacturers of rotary convertors were turning their attention to rectifiers.

In reply to Mr. W. F. Andrews, who stated that his undertaking had installed 3,000 kW of steel-tank rectifiers, the author said that he had not mentioned transformers and switchgear in speaking of the space occupied because these applied equally to glass and steel rectifiers.

* * *

Factory Accidents

The first of a series of three lectures delivered under the Shaw Trust took place at the ROYAL SOCIETY OF ARTS in London on February 25th. Mr. D. R. Wilson, H.M. Chief Inspector of Factories, dealt with the prevalence, distribution, and causation of accidents in factories in general terms, leaving his two deputies to discourse upon the more practical aspects of causation and prevention in subsequent lectures on March 4th and 11th. Mr. Wilson showed that in 1928 the number of persons employed in electrical engineering was 151,684 and the number of accidents was 2,670 per 100,000 employed. For the generation of electricity the figures were respectively 36,364 and 2,621. The fatality rate per 100,000 persons employed was five in electrical engineering and forty-nine in the generation of electricity. The fatality risk was 3.8 per cent. of total accidents in the case of electricity. With regard to accident prevention, Mr. Wilson considered first the environment in which good lighting was of paramount importance.

The Welding of Pressure Vessels

A practical paper on the repair of small boilers and pressure vessels by Mr. F. A. Glidewell was read at the JUNIOR INSTITUTION OF ENGINEERS in London on February 22nd. The author claimed that of all repairs to pressure vessels a very large percentage was carried out by electric welding. While in the past boiler insurance companies had not been favourably impressed by welding as suitable for boiler repairs, they now approved this method, due largely to the specially prepared electrodes which had been developed. Electric welding possessed many advantages over oxy-acetylene welding, one of the chief being that the area of plate heated by the latter method was considerably greater than in the former case and the amount of expansion to be allowed for proportionately greater. In the great majority of defects which had not gone too far the deposition of fresh metal by electric welding to make up wastage of plates effected a perfect repair.

Views on Tariffs

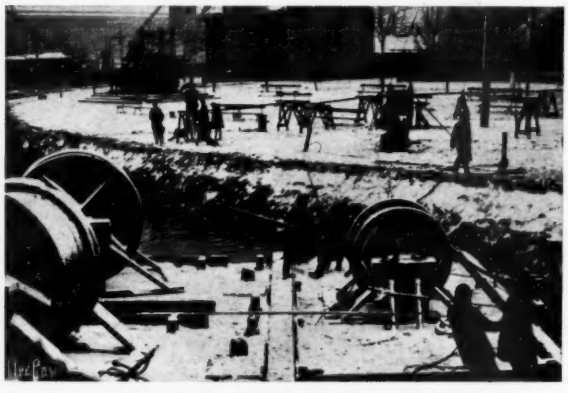
Four points of view on electricity tariffs were expressed at a recent meeting of the BIRMINGHAM ELECTRIC CLUB. Mr. S. T. Allen, Central Electricity Board, said that a great stimulus to the use of electricity had resulted since a large measure of standardisation had been brought about in supplies to authorised undertakers. Better knowledge in advance of the wholesale prices of supply had given greater confidence in development schemes. Mr. F. J. Elliott gave the point of view of the supply undertaking; Mr. H. Williamson that of the industrial consumer; and Mr. J. A. Sumner that of the domestic consumer.

Lighting in Mines

The South Wales and Monmouthshire Branch of the NATIONAL ASSOCIATION OF COLLIERY MANAGERS met recently at Swansea to discuss the aspects of colliery illumination raised by a paper by Mr. S. W. Richards on "Recent Developments in Electrical Plant for Collieries." Mr. C. H. McCale said that it would be a great benefit if light could be taken from the mains right up to the coal face, owing to the tremendous all-round advantage to be gained from better pit illumination.

Cables Laid Across the Clyde

Twenty-seven cables, with an aggregate capacity of 350,000 kW, were laid across the river Clyde at Renfrew last Sunday by the Clyde Valley Electrical Power Co. in co-operation with the Clyde Navigation Trust. It is sixteen years since submarine cables were laid across the Clyde by the Power Co., whose main generating plant is on the north bank and which has extensive transmission schemes through the south-west counties. The growth of suburban Glasgow has necessitated this operation. Our correspondent was told by the general manager that the company believes that new factories will shortly be established on the Clyde, and it is the intention to have electricity waiting for them.



The Clyde cable-laying in progress

All traffic on the river was at a standstill from an early hour in the morning until late in the afternoon. For several weeks a dredger had been digging a trench in the bed of the river, which is fully 30 ft. deep at low tide at this part, and 600 ft. wide. The trench was 12 ft. deep and 12 ft. broad; the company depends on the river silting over the trench to protect the cables.

Barges with their loads of cable were waiting in the Clyde Trust basin, not 50 yds. from the scene of the work. A tug towed the barge into position on the south bank, and the end of the cable was made fast to high-powered winches, the electricity for driving which was obtained from overhead lines from the other side of the river. The barge was then towed across river by winches on the north bank, those on the south acting as checks to the tide. Over six inches of snow fell while the work was being done. The principal counties to benefit through the scheme will be Lanarkshire, Renfrewshire, and Ayrshire. The point was stressed that not all of these cables will be used immediately; they are designed to meet the needs for another fifty years. Telephone communication was maintained between the various bases, and there was not a single mishap during the day. Over two hundred men were employed on the work, which had taken over a year to plan. The previous main transmission lines to the south bank are carried on 210-ft. towers above the cable site.

Correspondence

Correspondents should forward their communications as early as possible. No letter can be published unless we have the writer's name and address in our possession

Encouraging the Consumer

A friend of mine who has recently settled down near London was alarmed by receiving an application form asking for full and accurate particulars of the installation under the following heads :—

Lamps.	No.	Watts.	Cookers and Fires.	No.	Watts.	Other Apparatus.	No.	Watts.
15 watts	.....	.....	Boiling ring	.....	.....	Bed warmer	.....	.....
25 ,,	.....	.....	Cooker	.....	.....	Copper	.....	.....
40 ,,	.....	.....	Griller	.....	.....	Curling iron	.....	.....
60 ,,	.....	.....	Kettle	.....	.....	Fan	.....	.....
75 ,,	.....	.....	Toaster	.....	.....	Floor polisher	.....	.....
100 ,,	.....	.....	Bowl fire	.....	.....	Hair dryer	.....	.....
150 ,,	.....	.....	½ kW. fire	.....	.....	Iron	.....	.....
200 ,,	.....	.....	1 ,,	.....	.....	Motor	.....	.....
250 ,,	.....	.....	1½ ,,	.....	.....	Refrigerator	.....	.....
300 ,,	.....	.....	2 ,,	.....	.....	Vacuum cl'ner	.....	.....
500 ,,	.....	.....	2½ ,,	.....	.....	Washer	.....	.....
1,000 ,,	.....	.....	3 ,,	.....	.....	Water heater	.....	.....

One wonders what would happen if the consumer substituted a 25-W lamp for a 15-W one without informing the supply undertaking. Would he go to prison, or would justice be satisfied by the imposition of a stiff fine? Or suppose he added a vacuum cleaner or hair dryer, without letting the undertaking know? For some reason or other clocks are omitted.

Surely this is a case of statistics carried to excess.

February 20th. STATISTICS.

Power Station Emissions

To those of us who live in the vicinity of Lots Road power station it is some consolation to learn from Mr. Crampton's letter that whilst we are being sprinkled with soot and grits we are not being slowly poisoned by sulphur fumes, which are apparently performing a useful purpose in sterilising the air.

Although by removing the beneficial sulphur Battersea power station may be carrying matters too far, we Chelsea sufferers look with envious eyes at the almost colourless vapour issuing from its chimneys and wonder why Lots Road should continue to distribute soot and grits over the neighbourhood. Cannot some of the devices referred to by Mr. Crampton be employed to remove what is undoubtedly a very real grievance?

Chelsea, S.W.3, *February 25th.* G. R. THURSFIELD.

E.D.A.'s Publicity Methods

It is some time now since any advertisement of E.D.A. telling of the advantages of electricity graced the pages of the daily Press. One sees frequent reminders to "Get up-to-date with Gas," but never a glimpse of being "Modern with Electricity."

Of course, E.D.A. has been very busy making films, but whether these will "tell the story" time alone will show. If these films were for general distribution in cinemas they would undoubtedly have a large sales value, but as they are to be hired to local undertakings for showing in parish halls, &c., their sales value will be comparatively small. That Press and poster advertising reaches the masses has been realised by the B.C.G.A. for some time, and it is not slow to take advantage of the fact that there is no E.D.A. advertising to compete with.

Recently it has again been suggested that the electrical industry should adopt a rival publicity mascot to "Mr. Therm." The sooner it is realised that "Mr. Therm" often irritates his readers, causing an antagonism towards the advertisements, the quicker electrical men will awake to the fact that their own present advertisements are not particularly brilliant.

Co-operative advertising in local media is part and parcel of radio manufacturers' publicity, but in how many cases does this apply to the manufacturers of electrical appliances other than radio? One cannot call an occasional advertisement in an electrical handbook or magazine co-operative advertising, and if there are any manufacturers who consider they do co-operate then it is at such infrequent periods as to be unnoticeable.

Let E.D.A. set an example by a vigorous Press and poster campaign to push electricity, and let the manufacturers co-operate with their dealers in pushing both electricity and their own products in the local Press, and we shall see a great increase in the sales of both electricity and electrical appliances to the advantage of all sections of the industry.

Birmingham, *February 26th.* D. MILLS.

A Skilled Man's Plaint

I was interested to read the editorial in your issue of February 22nd, in which you commend the work of the Association of Supervising Electrical Engineers. I should like, however, to see more support and a better status given to the supervisor in the factory. Surely, if it is advisable to ensure that the installation of electrical plant is carried out in the most satisfactory way, it is just as necessary to ensure that the standards of manufacture are as high. Yet the factory overseer is often very little more than a clerk with the necessary appearance of authority.

Meanwhile there are practical engineers with many years' experience of actual work, but without the standard technical qualifications required for a staff position, who find it increasingly difficult to obtain a job, unless they are prepared to forget all they have learned and fall in with the ordinary crowd of repetition workers. It seems to me that the man with years of actual experience behind him would produce better work than the man with merely a long experience of supervising. Yet employers as a whole are loth to give him a job. It seems as if the principle of using semi-skilled labour for everything has taken such a firm hold on the industry that the skilled man is no longer needed. I shudder to think of the final effects of this principle.

I consider it high time that an association was formed for the purpose of protecting the skilled worker, and at the same time generally to raise the standard of skill throughout the industry. If this problem is not dealt with soon employers will discover that it is impossible to find an engineer who understands more than one operation before many years have passed. W. J. BAXTER.

London, N.W.5, *February 25th.*

Lighting Stained Glass Windows

I was very much interested in the suggestion made by Sir Herbert Baker and Mr. Walter Tapper mentioned in your last issue, as to the illumination from inside of the exquisite stained glass windows found in many cathedrals and churches and other buildings, and in the further note of Mr. C. R. W. Nevinson.

This is certainly something which will have to be done very carefully if the results are to be right from the artistic standpoint, as well as that of the purely lighting side. To endeavour to illuminate by any parabola form of floodlight would be to spoil the whole effect, because there would be extreme intensity on parts of the stained glass windows out of all proportion to what is desired from any point of view.

What is necessary is a projector which has even distribution characteristics, so that the whole of the stained glass window or panel, is evenly and wholly illuminated. This is a point which is so material that it cannot be too strongly stressed.

Manchester, *February 25th.* W. DE M. LANDON.

Floods in Scotland

A paragraph on page 250 of your issue of February 15th, headed "Inverness—Flood Damage to Power Scheme," states

The handsome stand of Bakelite, Ltd., at the British Industries Fair, Olympia.

that many thousand pounds worth of damage has been done by flooding to the Lochaber power scheme. This statement is entirely incorrect.

The operations referred to are work which was left in abeyance by the contractors pending the opportunity of observing the effect of heavy floods at the junction of the River Guilbhin and the dredged channel at the west end of Loch Laggan; they are not the result of any damage such as your paragraph suggests.

With regard to the end of the paragraph, it is a fact that the course of the River Pattack has been slightly affected by the lowering of the loch, though this river is at the east end of the loch and not at the west end. This alteration in the course has occasioned protective measures of a very minor nature to the banks, but no structural damage has been caused.

The British Aluminium Co., Ltd.

London, E.C.4, *February 26th.* G. A. STEEL,
Director and General Manager.

Domestic Electrical Service. By F. D. Parker

Architects and development: The value of assisted wiring

THE portability of electrical domestic appliances has proved to be a good selling point and the development of easy-purchase and hire schemes has enabled consumers to secure appliances and free service for a very small initial cost. The maximum use of electricity is not being made initially in newly erected buildings, considering the reduction in capital cost effected and the resulting indirect advantages, though recently electric working-class flats, especially in the London area, have proved very successful from both the user's and supply authority's points of view.

In the middle-class house the same rate of progress is not found. Electricity for heating is still considered by the average householder, and unfortunately by many architects and builders, as an auxiliary expedient. Traditional designs and layouts are still very evident, *e.g.*, the microscopic bedroom fireplace with its expensive tiling materially reducing room area and yet almost useless for its intended purpose.

Other improvements have taken the form of extra handbasins in bedrooms and radiators in halls, the general practice being to connect all this apparatus to a central hot-water system. This arrangement necessitates the installation of large kitchen boilers and a great deal of pipework. Tubular heating instead of the radiator and self-contained electrically heated handbasins are seldom employed in spite of the considerable saving in pipework, labour and initial capital cost. In the third bedroom of the average five-roomed modern house often no provision is made for heating whatsoever; as no chimney is provided there is great scope for electric heating, which in this instance is without a competitor.

Installation during Building

If competent advice had been sought regarding positions of lighting points, plugs, switches, &c., and electrical heating generally, before such houses were erected much capital outlay would have been saved and the houses made much more serviceable and attractive. Instead, the supply authority is usually consulted after the house has been erected with a view to improvising methods of room and water heating, and owing to the design of the house is often at a disadvantage as apparatus has often to be duplicated.

Builders and architects should therefore be kept well acquainted with the development of domestic electrical apparatus, for it is upon the former that the rate of genuine development largely rests. The frequent publication of electrical supplements to architectural and allied journals may materially assist in this direction. Supply authorities could also devote more direct attention to the architects and builders in their areas, with a view to the installation of more permanently installed apparatus, even paying architects a small fee for any services rendered in this direction.

With regard to electrical advertising generally, a recent perusal of several prominent weekly journals revealed that 90 per cent. of the advertisements dealing with domestic cooking and heating apparatus were confined to gas appliances, especially fires and cookers. What are the electrical manufacturer and E.D.A. doing to permit such a state of affairs? The position is much the same regarding cookery books.

Assisted Wiring

The generous manner in which gas authorities deal with the question of free and subsidised wiring and the fixing of apparatus could be well emulated. Often in the case of electricity because a small contribution is not available valuable business is often lost. There appears no reason why special concessions should not be allowed in instances where large consumptions are to be anticipated. Even if builders are not prepared to install adequate numbers of plug points in new property, there is no reason why supply authorities should not contribute the slight difference in cost in order to ensure later use of electrical appliances. If this wiring is effected at the same time as the rest of the house wiring, the additional cost would be comparatively small compared with that for doing the work afterwards.

The position of the main service in new property is another point worthy of more consideration. Frequently the tendency is to install the service within close proximity to the supply mains, sometimes necessitating the installation of long submains for cooker circuits, and as the cost of the latter has to be borne by the consumer its existence is sometimes a deterrent to the installation of a cooker or similar apparatus.

The value of assisted wiring is substantially evinced when large houses are being converted into flats. Structural alterations alone involve considerable expenditure, so that landlords are generally not prepared to go to any great expenditure in splitting wiring and providing sub-mains and plug points. Prepayment metering is usually preferred, and any scheme such as free wiring is welcomed. The initial cost of splitting the wiring and providing separate meters is often prohibitive in the case of electricity unless the supply authority makes some contribution towards the cost, therefore in the average case, except for lighting purposes, gas is employed.

Even if electric slot meters are installed this sometimes does not solve the question of water heating if a common bathroom is shared by two or more flats and the water heater has to be connected through a slot meter, as the user cannot pay for the hot water consumed or obtain it in the desired time if an ordinary electric water heater is installed. If a constant flow gas geyser is installed this difficulty is eliminated. The alternative is therefore to install heavily loaded water heaters to give an immediate supply, or convert the original hot-water system to electric heating and install series connected heaters. This arrangement perhaps represents the only feasible solution, provided a two-part tariff for water-heating purposes is available, the majority of the revenue being derived from the fixed charge so that the landlord can split this charge evenly among his tenants and include it in the rent for the flats.

The heating of large flats to a temperature of 50 deg. to 55 deg. F. throughout the year by means of thermal storage and effecting the remainder of the heating locally may prove a more economical proposition than individual local heating, due to the very low off-peak tariffs now available for the purpose.

Domestic Water Boiling

One of the chief deterrents to the advancement of electric cooking is the alleged slowness of the average cooker hot plate. This difficulty has in some measure been obviated by always advocating the employment of electric kettles and immersion-type elements for water boiling. This arrangement could be well applied to the heating of other liquids if apparatus could be suitably designed, especially for egg boiling, &c.

The employment of hot plates to raise water drawn from thermal storage heaters to boiling point should be discouraged, as during the time taken for the hot plate to heat up and become really effective, considerable cooling off of the water may take place. Kettles employing immersion elements are a much more efficient arrangement, due to the decreased time lag.

The importance of standing water-boiling and other heating apparatus on non-heat-conducting bases, such as wood, is not always realised. Neglect of this simple precaution may in some instances materially affect the current consumption. A kitchen-type kettle has recently been produced possessing no feet. It is regrettable that for the sake of a few pence in manufacturing costs in providing feet or a stand an otherwise well-designed appliance is prevented from achieving maximum efficiency. If such a kettle is stood on a cold cooker hob it may take 25 per cent. longer to boil than when placed on a wooden stand. Mention, however, could be made of this point in the instruction leaflet.

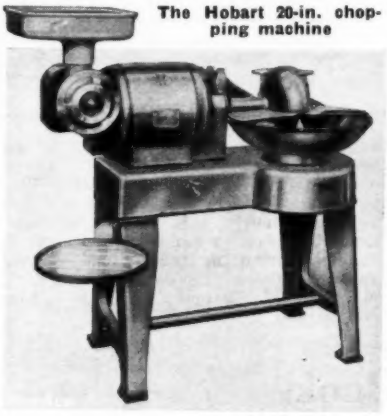
The manufacture of a storage water heater possessing two water compartments and sets of elements interconnected with each other, one container holding water heated to 170 deg. F. and the other water almost at boiling point would seem a good proposition, especially a 3-gallon kitchen-type heater which can usually be connected directly to the water mains. If the elements were thermostatically controlled the efficiency would be greater than any of the other methods usually adopted for boiling water.

New Apparatus and Devices

for Domestic, Cooking and Heating, Lighting, Power and Scientific Purposes

Chopping and Mincing Equipment

Two new meat choppers exhibited by the HOBART MANUFACTURING CO., LTD., Charterhouse Street, London, E.C.1, at the Dairy and Ice Cream Exhibition were 20-in. and 25-in. models. The former (illus.) incorporates a 1½-h.p. 960-r.p.m. motor driving three knives of new design that are mounted directly on the motor shaft as one unit; the cone-type bowl moves at 10 r.p.m. The comb is separate from the bowl cover and is held by a hand screw, while the cover itself is easily removable for cleaning, but is interlocked with the switch (or with the clutch-operating lever in the case of the 25-in. model), preventing the starting of the knives while the cover is raised.



The Hobart 20-in. chopping machine

The 25-in. type has a separate clutch mounted on the chopper drive to enable both ends to be independent of each other, and is also fitted with a safety device on the drive which operates should any foreign matter get passed to the chopper end. It resets itself when the substance is removed.

Both machines are designed on the same lines, but the larger has a 3-h.p. motor and remote-control starting. In each case the chopper end can be used for mincing meat.

Battery Chargers

Metal rectification is now employed in a wide range of battery chargers recently introduced by MESSRS. F. C. HEAYBERD & Co., 10, Finsbury Street, London, E.C.2. Two types are available. One, type "A," comprises an impregnated mains transformer, metal rectifier and a fixed ballast resistance; the panel is fitted with a mains input plug and socket, intermediate tappings and shrouded output terminals, while type "B" has in addition a switch, fuse and variable slide resistance.

New Heayberd chargers: (above) type "A," and (below) type "B"

Both types are supplied in a perforated metal case with rubber feet. The fixed output series is obtainable in seventeen sizes rated at from 8 V d.c., 5 A for three 2-V cells to 160 V d.c., 0.75 A tapped at 80 and 30 V for 64 cells. The "B" models are available in similar sizes but with outputs variable in the first instance from 2-5 A and in the last-mentioned size from 0.25-0.75 A.

Paint-spraying Equipment

The "P.10" portable two-gun spray-paint plant is a new product of B.E.N. PATENTS, LTD., Gorst Road, Park Royal, London, N.W.10. Special features of this model are the mounting of the receiver out of sight under the frame; the special arrangement made for "spragging" the machine when in use to prevent "creep" and eliminate vibration; and the improved cooling system.

The totally enclosed single-cylinder compressor is pressure-lubricated and coupled by a V-belt to a 2-h.p. electric motor. A spraying pressure of from 20 to 80 lb. per sq. in. is available.

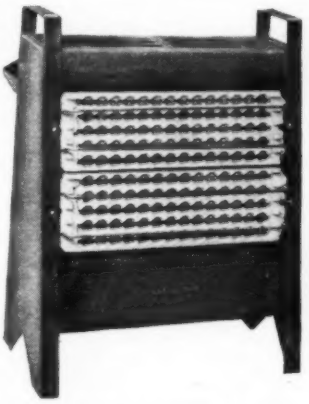
Trailing Cables

DERBY CABLES, LTD., Derby, have placed on the market a range of tough-rubber-sheathed cables which conform to the appropriate sections of the Coal Mines Regulations. The cradle-core type has been adopted as standard with rope-strand conductors. The cores are distinguished by the use of coloured tapes, this method being adopted in preference to colouring the outer jackets of the v.i.r. in order to avoid the risks of decentralisation and of the cores and the sheath becoming partially vulcanised together during the final process of manufacture.

The tough-rubber sheath used offers remarkable resistance to cutting and crushing, and its chemical and physical properties are claimed to be such as to help to ensure a long life. The specification describing these cables in detail contains also full directions for cable repairs, and gives particulars of Derby shot-firing cables.

A "Utility" Fire

MESSRS. BELLING & Co., Bridge Works, Southbury Road, Enfield, have introduced a simple fire made of stout-gauge sheet iron, finished in synthetic enamel, three colours being available. The framework of the fires is designed to keep cool during operation, and two carrying handles are provided, while the back is easily removable. The system of ventilation is such that there is a considerable amount of convected heat. A number of holes are provided in the bottom of the fire and a series of slots are cut in the flat top to circulate the air.

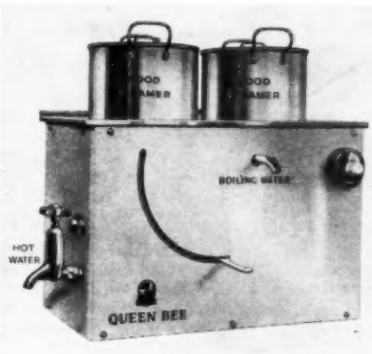


The Belling "Utility" fire

Two sizes are available, Model 601, loaded at 1 kW, and Model 602, which is fitted with a 2-kW element, the control being by means of an M.K. switch.

A Multi-purpose Water-heater

Hot water, boiling water, and steam for cooking are obtainable from the "Queen Bee" water-heater, which consists of three tinned-copper water containers, and is connected directly to the cold-water main, the inflow being controlled by a ballcock. The heating of the water is thermostatically controlled. Hot or boiling water can be drawn off independently; the boiling-water container is fed from the hot-water unit, and is heated by two elements controlled by a three-heat switch on the front of the appliance. Any amount up to three pints may be drawn off at a time, and a further similar amount may be drawn off after allowing an interval of one minute. The standard model provides in addition two gallons of hot water. There is a maximum loading of 2¼ kW, but by means of the three-heat switch a loading of only 375 W can be obtained. It is claimed that this loading (375 W) is sufficient to enable steam cooking to be carried on in the two steamers which are supplied with the heater.



The "Queen Bee" water-heater

The apparatus is enclosed in a lagged sheet-steel body which is stove-enamelled white, and the top is fitted with a monel metal polished tray or a porcelain enamelled tray provided with two steam ports. The manufacturers are MESSRS. E. NELSON, Gillett Street, Preston.

A Switchboard Load Indicator

In a switchboard-type maximum load indicator developed by MESSRS. PRICE & BELSHAM, LTD., Tamworth Lane Works, Mitcham, the movement is identical with that of the P. & B. standard type, but the case is circular with chromium-plated facing so that the indicator will line up with switchboard pattern ammeters and voltmeters. Although back connections are fitted on the standard model these can be brought out to

terminals on the bottom of the case if required. A pedestal type is obtainable for mounting on motor starters, the strip connections being brought out through the base.

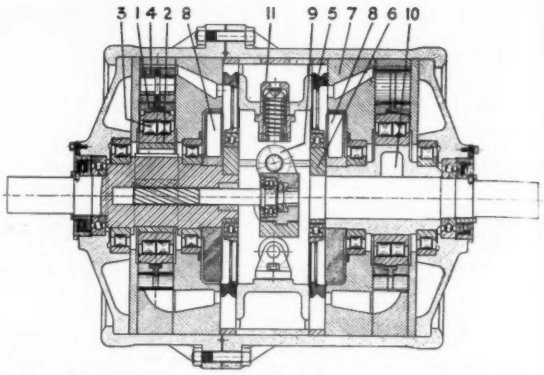
To reset the idle pointer there is a knob on the front immediately below the dial. The standard time lag is 20 min., but indicators can be supplied with lags of from 12 to 30 min. Alarm contacts can be fitted to ring a warning bell or to operate a relay circuit after a time lag, when the load reaches a predetermined value. The instrument weighs 3.5 lb.

Fluid-power Transmission

Messrs. Haslam & Newton (Derby), Ltd., Alfreton Road, Derby, have completed the designs of a series of standardised fluid-power transmission units ranging from 10 to 156 h.p. Each unit comprises in one casing a motor and a pump of similar construction except that the capacity of the former is constant and that of the latter is variable from zero to full load; speed variation of the driving end is obtained by altering the discharge at the driven end.

The pumping or propelling space is formed of a ring, 1 in the diagram, mounted on, but free to rotate relatively to, an eccentric 2, from which it is separated by a roller bearing 3, the only rotative movement of the ring being that necessary to ensure rolling action at the point of contact between the roller 4, the wall of the pocket and the ring. The rollers act as a wall (not as pistons) to divide the ring into self-contained rectangular compartments, half of which delivers fluid at any moment, while the other half is being filled. Only two of the roller divisions are subjected to pressure, and the rollers act as pressure seals.

The distributing valve 5 does not rotate round its own axis, but gyrates round a circle equal in diameter to twice the throw of its operating eccentric 6. The space above one roller plus the intervening space between the roller and the next forms one displacement element and there are separate ports to each section of this element, so that the valve opens and closes the ports in pairs. Other parts shown in the diagram include distribution rings 7, balance weights 8, control mechanism for altering the delivery from the pump end by varying the throw of the pump eccentric 9, fixed eccentric at motor end 10, and relief valve 11.



General arrangement of type 100 7.5 fluid-power transmission

New Books

Electric Circuits and Wave Filters. By A. T. Starr. Pp. 375; figs. 335. London: Sir Isaac Pitman & Sons, Ltd. Price 21s. net.

This work deals generally with the theory of electrical networks and, in particular, with wave filters, so that it covers a large field of subjects which have direct applications in most branches of electrical engineering. The author starts from first principles, assuming in the reader some familiarity with the subjects discussed. The first chapter gives a summary of the mathematical processes leading up to the theory of a.c. working and electric circuits in general, which is dealt with in the next two, followed by chapters on the design of resistances, coils, condensers and two-terminal impedances. This material forms an excellent introduction to the main part of the work, which is concerned with the subject of networks and filters.

In the explanation of the four-terminal network use is made of methods employed in treating power transmission, and this is followed by a detailed exposition of the principles underlying wave filters. Band-pass filters are fully dealt with, as are transients in networks, including the results of some of the author's own work on the latter subject.

The work is an important contribution to the literature on electric circuits, and should prove of particular value to electrical engineers who are engaged in communication services or power transmission.

Die Ortskurventheorie der Wechselstromtechnik. By Dr. Ing. Gunther Oberdorfer. Pp. 88; figs. 52. Munich: R. Oldenburg. Price: 4.50 RM.

The author in his preface informs his readers that "Ortskurventheorie" is a method of representation which is to-day used wherever possible by well-informed people. He states that it is respectfully esteemed by those who are half-informed, but usually neglected by them because of the difficulty of understanding it, whilst uninformed people usually keep away from it because of its being based on calculations of complex quantities. This leads the reader to expect something entirely novel, but such is not the case. "Ortskurventheorie" might be described as the theory of vector loci, and familiar examples of such curves are impedance loci and some types of circle diagrams such as are commonly used in alternating-current theory.

The first part of the book deals with ordinary vector theory, addition, multiplication and inversion of vectors, with applications to a.c. theory. The general form of "Ortskurve" is then defined and the number of special cases considered, giving straight lines, circles and other loci. A number of numerical examples are then worked out for familiar problems, *e.g.*, the voltage drop of a transmission line, the variation of current in parallel circuits with variation of inductance, &c.

Although the book does not present anything particularly new, it might, with considerable advantage, be read by British electrical engineers as there does not appear to be any similar treatise in English.

Elementary Electricity and Magnetism. By R. W. Hutchinson. Pp. 475; figs. 297. London: University Tutorial Press, Ltd. Price 6s. 6d.

Mr. Hutchinson is an author and teacher of great experience and in the present volume he has produced a first course in electricity and magnetism in which the material is dealt with in the light of present-day knowledge of the constitution of matter. Simple language is used and, whether dealing with the modern theories or with the older principles, the material is adequately and clearly explained, the author's knowledge of the difficulties of students and of the places where special precautions need to be taken against wrong conceptions being evident.

Points to which criticism may be directed are few. In the section dealing with lamps, no use appears to be made of the "lumen" which is unfortunate in view of the present-day commercial importance of this unit. In this section, also, a statement appears to the effect that gasfilled tungsten filament lamps have nearly double the efficiency of vacuum lamps. Reference to the British Standard Specification will show that this is far from correct when applied to the lamps of small output in the range which is common to both types.

Some students may possibly get an inexact idea from an example worked on page 344 which is concerned with the energy lost in a cable. In the problem it is stated that the current "averages" 50 A while the method of working is appropriate to a steady current of 50 A. If the current fluctuates, as appears possible from the wording of the question, the loss would be greater than the value given in the solution, and mention should be made of this fact. In a few instances the terms and spellings preferred in the British Standard Glossary are not employed. The book can be well commended, the material being dealt with in an exact manner and in a pleasing style.

* * *

Shorter Notices

The forty-first edition of "Kempe's Engineer's Year-book" (Morgan Bros., 31s. 6d.) has just been published. The book has again been arranged in two main parts, the first containing the sections dealing with technical data and principles, and the second sections giving useful descriptions of various products of engineering firms. A careful check has been made of last year's contents, all data and tables being revised and brought up to date, several additions and improvements being made. Particular attention has been devoted to the important sections relating to steam power, electrical engineering, electric traction, refrigeration, and gearing, all of which have been revised by specialists. Other sections which have also been specially contributed or revised for the present issue include water-power development, pumping, water turbines, solid, liquid and gaseous fuels, pulverised fuel, oxy-acetylene and electric welding and cutting, power transmission, depreciation of plant and machinery, legal notes, and radio communication. There are 2,641 pages.

The 1935 edition of the "Broadcaster Radio and Gramophone Trade Annual" (5s.) has a number of new features in the technical sections, one of which gives quick tests for nearly a hundred standard types of receivers. The statistics include a twelve months' county-by-county chart of listening licence figures; the number of homes in every district in the country which can use mains sets (and whether a.c. or d.c.) and the number which can only use a battery receiver; and foreign trade figures for twelve months.

"Marketing Industrial Equipment." By B. Lester. Pp. 307; figs. 44. London: McGraw-Hill Publishing Co., Ltd. Price 21s.

"Technical and Scientific Encyclopædia—Vol. I." Edited by C. F. Tweeney and I. P. Shirshov. Pp. 672 (illus.). London: Hutchinson & Co. Price 28s.

Our Electrical Trade with Argentina

By H. C. Siddeley

SINCE the Ottawa Conference Great Britain has tended more towards the concentration of her efforts upon fostering inter-Empire trade. This is a natural development from the close ties of race and financial interests between members of the Empire. It must, however, be borne in mind that British exports to the Dominions amounted to less than half the total, *i.e.*, 46.9 per cent., in 1934. As Great Britain depends on her exports to pay in a large measure for her imports (except for those which she receives against payment for services and as interest on her foreign investments), it is important that whatever is done to encourage Empire trade shall not injure the rather greater trade done with other countries.

Argentina stands out as an example of a country which, although classed as a foreign country, has a very old and close connection with British trade and finance. It was British capital which originally developed Argentina, by constructing her railways, bridges, and other public utilities. Great Britain has investments in Argentina greater, with only one or two exceptions, than those held in any other country; the total has been computed as between 500 to 600 millions sterling.

Half of this has been invested in the construction of railways, which opened up the country and started its vast agricultural activities. All the railways which have their termini in Buenos Aires are British owned. The city has a population of 2,250,000, which represents nearly 20 per cent. of the total population of the Republic. This population is greater than that of either Australia or Canada, and the production per head of population is remarkably high. Payments of interest, &c., on our investments can only be made by Argentine exports, and any decrease of our purchases must directly affect either the value of our exports to them or the payments of interest due to British investors.

BRITISH ENGINEERING EXPORTS TO ARGENTINA.

Class.	Average of 1928, 1929 and 1930.		1931.		1932.		1933.		1934.	
	£	%	£	%	£	%	£	%	£	%
Insulated cables	356,000	100	151,000	43	27,800	7.8	29,909	8	72,049	20
Elecl. apparatus and machinery	974,000	100	585,000	60	217,000	22.5	172,306	18	223,878	24
Total elecl. exports ...	1,330,000	100	736,000	56	244,800	19	202,215	16	295,927	23
Machinery (excluding elecl.)	1,333,300	100	982,400	73	379,300	28.5	540,459	40	691,307	51
Vehicles (rly. and road) ...	2,808,000	100	1,652,000	59	115,000	4.1	328,835	12	562,412	20
Iron and steel, and manufactures thereof... ...	4,853,000	100	1,441,000	35	1,195,000	25	1,670,000	30	1,711,529	31
Total engineering exports	10,324,300	100	4,811,400	48	1,934,100	19	2,741,509	27	3,261,175	32
Total value elecl. imports	100%	—	75%	—	62%	—	62%	—	61%	—
Total value of British exports	100%	—	56%	—	19%	—	16%	—	23%	—

British Imports and Exports

In 1934 Great Britain took 37 per cent. of Argentina's total exports, amounting in value to £47,046,000, an increase of £5,400,000 over 1933. British exports to Argentina in the same year amounted to £14,661,000, an increase of £1,600,000 over 1933.

This result has been brought about in a large measure through the Roca Treaty, which has considerably improved trade relations with Argentina. The treaty provides that the amounts realised by Argentine exports to Great Britain shall be first used in payment for British imports, after which the Government shall be entitled to retain a reasonable amount to enable it to pay interest on its own foreign debts, the balance being then available for meeting the interest and charges payable on British investments. Our balance of trade is in favour of Argentina to the extent of £32,385,000, which provides for the payments above mentioned and for other services, such as freights, insurances, &c., due to British companies.

With the exception of our Dominions and India, there were in 1934 only two countries which bought more from us than did Argentina, viz., the United States and France. British imports from Argentina were only exceeded by those from Australia, Canada, and the United States. These figures will show the importance of Argentina in the trade of Great Britain.

Expressed as percentages, Great Britain buys 6.4 per cent. of her total imports from Argentina and sells 3.7 per cent. of her total exports to that country, these representing 37 per cent. of Argentina's total exports and 24 per cent. of her total imports.

Turning now to the electrical trade between the two countries, Great Britain exported in 1934 electrical machinery and apparatus to the value of £300,000, being 2 per cent. of the total British electrical exports. This compares unfavourably with the general average of 3.7 per cent. This general average, if realised by the electrical industry, would increase our total to £525,000.

Since 1930 the total Argentine imports have steadily decreased until last year, when the conditions of the country improved. The following table shows the imports of various classes of British engineering materials during the past four years. For the purpose of comparison, an average of the imports of 1928-29-30 has been taken as representing a normal year's trading (100 per cent.). A comparison is also given of the variation of the total British electrical imports into Argentina since 1930, compared with that of her total electrical imports.

These tables show a reduction of 40 per cent. in Argentine purchases of electrical materials, but they also show that Great Britain's portion has decreased by 77 per cent. since 1930. It is instructive to compare the proportion of electrical imports to engineering materials generally, which followed very closely until 1934, when the latter increased more rapidly. These tables show an all-round improvement in British sales of electrical materials in 1934, although the value of the total electrical imports has remained practically stationary since 1932.

Under the favourable conditions applying to British trade in Argentina there is no reason why British engineering exports should not return to the 1930 values if and when Argentina regains her former prosperity.

Exchange Restrictions

One of the greatest restrictions to foreign trade at present is the difficulty of obtaining the necessary exchange at official rates to pay for imports. Owing to the balance of trade with Great Britain being in favour of Argentina, there is now no difficulty in obtaining sterling exchange in payment for British imports since the Roca Treaty. Other countries, such as the United States and Germany, which have a balance of trade unfavourable to Argentina, find a difficulty in obtaining the necessary exchange at official rates, and so have to resort to purchasing their requirements in the open markets, which means a difference of 10 to 15 per cent.

All exchange, both for imports and exports, is controlled by the Government. It is a condition of obtaining a permit for exports that the foreign money realised shall be sold to the Government at the fixed rate of $15 to the £.

All official exchange in payment of imports, &c., is sold at the rate of approximately $17 to the £, which is gradually improving, so that the Government makes a profit at the rate of $2 to the £ on all foreign exchange sold. The open-market rate has fluctuated within the last two months between $20 and $18.90 to the £. The Argentine Government resorted to this scheme in 1933 in order to provide funds to meet its guarantee of a minimum price for wheat exported and to cover its own additional outlay in providing interest, &c., on foreign loans due to the fall in the value of the peso. Seeing that the price of wheat increased beyond the minimum guaranteed almost immediately very little loss ensued to the Government, which eventually made a profit on exchange of over $90,000,000 during the first eleven months.

The Government was also of opinion that the fall in the value of the peso would reduce imports, thus increasing its favourable balance of trade, but, owing to the improved conditions of the country, the value of imports during 1934 has actually increased. This is also a good indication of the improved spending power of the people.

Since 1933 the Government has been engaged in converting its internal and external loans. Most of its internal loans have now been reduced to a 5 per cent. rate of interest, and some British loans have been converted from 5 per cent. to 4½ per cent. This has resulted in a saving of approximately $35,000,000 per annum in interest charges.

Everything, therefore, points to a more satisfactory financial position in the future. Argentina, however, is a country whose products depend on the world's prices, which can only improve with the increase in prosperity of the world at large, but

Argentina's internal conditions are now such that, granted even a relatively small rise in the world's food prices, its own prosperity would increase very rapidly, providing it with the necessary funds to purchase many of the things which it has had to do without during the last few years. Stocks have been depleted and have not been fully replaced, due to the lower value of the peso, but the time has now arrived when these must be replenished.

The Electricity Supply

The present conditions governing the electricity supply industry are unsatisfactory and chaotic. The control of this is in the hands of the Provincial Governments, who hand it out to each town independently. There is no central control or State regulations. Each municipality, therefore, has complete control of electricity supply in its own area. Except in Buenos Aires, there are no exclusive municipal concessions, and anybody is at liberty to start an electricity supply in any other town. There is a movement at present to start up competing supply companies in several towns where the present supply is in the hands of foreign companies. These are known as " Co-operative " companies formed locally by interested consumers. So far little success has been achieved by such companies, their only effect being to make conditions in the industry more confusing. The control of electricity supply, if centralised under the Federal Government would come under the Minister of Agriculture, who has already taken some steps to this end by collecting statistics referring to the present state of the industry. The introduction is contemplated of some control similar to that in Great Britain, *viz.*, by the appointment of Electrical Commissioners. An alteration in the terms of the constitution would be necessary to do this and so take control out of the hands of the Provincial Governments.

The supply in all the larger towns is in the hands of foreign companies, which between them own 320 stations out of a total of 1,100. The two companies supplying Buenos Aires and suburbs generate 55 per cent. of the energy sold in Argentina. Rosario and Bahia Blanca, between them, supply 6 per cent., and the larger of the two American companies supplies 10 per cent., leaving 29 per cent. for the eight hundred-odd other stations. This indicates the relative small output of the average station, most of which are under 100 kW.

The latest statistics show that the total plant capacity is 1,060,000 kW, with an annual production of 1,950,000,000 kWh.

The Larger Stations

The most important station is the new one recently built by C.H.A.D.E. in Buenos Aires, containing four 50,000-kW turbine sets. This company also has 287,500 kW installed in its original station, but some of this is old. The new Italo station, also in Buenos Aires, contains three 34,000-kW turbines. Rosario, Bahia Blanca and Santa Fé are all steam stations, but most other stations outside the large towns have Diesel engines. Very few of the towns are inter-connected. The municipalities are averse to consenting to this arrangement as it interferes with their control of the undertakings in their areas.

Distances are too long between towns and the loads in intervening towns are too small to justify any great extension of linking up, but there is no doubt that should a satisfactory system of central control be introduced whereby the veto of the town council could be overcome, then some extension of this system to certain zones would be possible and profitable. With the absence of any security of supply it would not be a business proposition to embark on the capital outlay necessary.

There are, however, a few h.p. lines connecting up the supply in certain areas. The most important of these are as follows: 50 km. of 66,000-V underground cable connecting Buenos Aires with La Plata; 166 km. of overhead transmission at 66,000 V connecting Villa Mario and Cordoba; 110 km. at 33,000 and 13,000 V round Chinilesy in the Province of Buenos Aires; and 56 km. connecting up the smaller towns in the Cordoba hills.

Owing to the isolated position of the farms (estancias), these generally have their own lighting plant, consisting as a rule of a small petrol set (½ to 1 kW), with accumulators. Owing to the increasing use of domestic electrical appliances, such as refrigerators, irons, radiators and wireless, there will be a demand for larger sets up to 5 kW, which will be of the heavy-oil-engine type. Some of the larger estancias may even consider the installation of a plant large enough for their power requirements on the farm.

Most of the water is pumped by windmills, although now in the suburbs of Buenos Aires and elsewhere there is a gradual changing over to electric pumping to avoid the inconvenience and unsightliness of windmills. Until recently the windmill had not been used for generating electricity, although in certain parts of the country there is a fairly continuous wind pressure, and progress is being made in the improvement of these sets.

The Prospects

It will be seen that Argentina provides a very favourable and growing market for British engineering products in the future. All the conditions are favourable to this extension, but manufacturers require, through their selling organisations, to give service and facilities equivalent to those of the United States and Germany. Both these countries have very complete and efficient selling staffs and good showrooms.

It is important for the manufacturers of Great Britain to bear in mind that Argentina is one of the best examples of a country depending solely on her exports to pay for her imports and to meet her financial obligations. Any decrease in her exports must react immediately on her spending power, and any diminution in her sale of beef to this country, for example, means a reduction in her purchase of British manufactures. Under the present system of bilateral trade agreements business becomes merely a matter of exchange of products, and any reduction of the purchases by one country must react on the purchases by the other.

There is no great public opinion in favour of Argentina setting up her own works for the manufacture of engineering products, as it is well understood that this would have a direct repercussion on the sale of the country's natural products. This aspect is well illustrated by the fact that the title of Minister of Commerce and Industry is only a subsidiary title of the Minister of Agriculture.

In the Courts

MR. JUSTICE EVE, in the Chancery Division on February 22nd, reserved judgment as to the meaning of the word " amalgamation " as affecting trustees holding ordinary stock in the Westminster Electric Supply Corporation, Ltd., there being a proposal to transfer to London Associated Electricity Undertakers, Ltd., the share capital of the Westminster undertaking (amongst others), the question for decision being whether a scheme for the amalgamation of companies came within the meaning of Section 10 (3) of the Trustees Act, 1925.

By the summons, which was taken out by the trustees under a settlement made by Mr. Henry Claude Walker, the question for the Court was whether the trustees under the section had power to concur in the scheme and to accept instead of stock which they now held in the Westminster undertaking stock of the London Associated Electricity Undertakers, Ltd.

The case was a test one, the matter being brought before the Court in the present form to secure a ruling for the guidance of trustees in similar circumstances.

Infringement of Valve Licences

In the Chancery Division on February 26th Mr. Justice Eve had before him the case of M. O. Valve Co., Ltd., *v.* Ward on a motion by the plaintiff company for judgment by consent in an action against the defendant for breach of conditions of certain limited licences in connection with patented wireless valves, one condition being not to sell below a stipulated price, and the second not to sell the manufacturers' valves except as part of complete wireless sets.

The defendant appeared in person and consented to the injunction claimed, to pay £5 agreed damages, and £10 for costs.

His Lordship entered judgment accordingly.

Winding-up Order

In the Companies Court on February 25th, Mr. Justice Pennett had before him a petition for the compulsory winding-up of Metropolitan Electrical Equipment, Ltd. Counsel for the petitioner said his client had a judgment debt against the company.

A director of the company, who appeared in court, agreed to a compulsory order, and his Lordship made an order in the usual terms.

Indexed List of B.S. Specifications

The B.S.I. has issued its half-yearly handbook. Special reports on standardisation in the chemical industry, by the chairman, Dr. E. F. Armstrong, F.R.S., on standardisation in the building industry, and industrial standardisation as viewed by the Imperial Economic Conference are included. Copies of this handbook (reference C.D. 5050) are available from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 1s. 2d., post free.

Business and Industrial Notes

The Week's Electrical Trade News from all Sources. Commercial and Industrial Developments. Business Changes, Market Prices for Materials, Trade Openings, New Publicity Literature, Liquidations, and Failures

The Marking of Imported Radio Apparatus

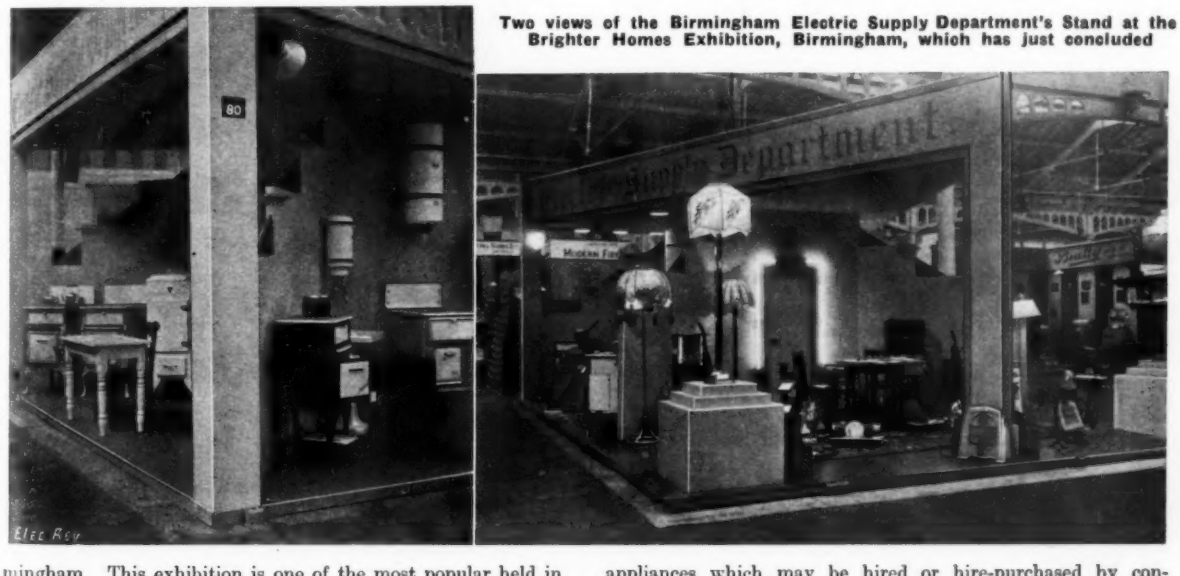
The Board of Trade announces that an Order-in-Council was made on February 21st under Section 2 of the Merchandise Marks Act, 1926, requiring the following descriptions of imported radio goods to bear an indication of origin :—Radio receiving sets; radio gramophones; electrical gramophones; electrical audio frequency amplifiers; loud speakers; loudspeaker units; battery eliminators; chokes; condensers; drives for variable condensers; electrical gramophone pick-ups; volume controls; electrical gramophone motors; gramophone turntable units comprising an electric motor and a turntable; head phones; resistances; valveholders and adaptors; transformers; tuning coils; resistance capacity coupling units; choke capacity coupling units; chassis or frames carrying or adapted to carry a collection of components. The Order is the Merchandise Marks (Imported Goods) No. 2 Order, 1935, and will come into force on August 21st next. Copies will be available shortly from H.M. Stationery Office.

Dowsing Co. (Electrical Manufacturers), Ltd.

The Dowsing Radiant Heat Co., Ltd., informs us that it has transferred the electrical manufacturing side of its business to the recently formed Dowsing Company (Electrical Manufacturers), Ltd., as from December 31st, 1934. All undelivered balances of supplies or orders placed with the Radiant Heat Co. should be transferred to the new company, which will also settle all outstanding debts owing by the Dowsing Radiant Heat Co. The formation of the new company was recorded in the " New Companies Registered " section of our issue of February 15th.

The Birmingham Brighter Homes Exhibition

In the accompanying illustrations we show two views of the stand arranged by the Birmingham Corporation Electric Supply Department at the Brighter Homes Exhibition which has been held during the past three weeks at Bingley Hall, Birmingham. This exhibition is one of the most popular held in the city and annually attracts large numbers of people from Birmingham and the surrounding districts. The Corporation Electric Supply Department's display included lighting fittings, cookers, water heaters, refrigerators, fires, vacuum cleaners, and other domestic electrical appliances.



Two views of the Birmingham Electric Supply Department's Stand at the Brighter Homes Exhibition, Birmingham, which has just concluded

Maidstone Contractors' Dinner

The annual dinner of the Maidstone branch of the Electrical Contractors' Association was held on February 20th at the Royal Star Hotel, Maidstone. Mr. O. C. Jones (chairman of the branch), who presided, claimed that, electrically and technically speaking, Maidstone was a " leading light " in municipal matters. Councillor C. G. Larking said the time had arrived when the expenditure of local bodies should be limited. He thought that the interests of the borough and of the ratepayers could not be better served than by having private contractors to do their electrical work. In proposing the toast of the E.C.A. and the Maidstone Branch, Mr. H. A. Lingard (director of the B.T.H. Co.) referred to the danger created by defective earthing and the sale of poor electrical appliances. He was glad to see that the Manchester Branch of the E.C.A. was instituting an electrical proving station. He was sure that if the manufacturers of appliances and electrical contractors sat in conference together they could put the electrical industry on its feet in this country. Mr. L. C. Penwill (director of the E.C.A.), who responded, stressed the need for standardisation in the electrical industry and for a national code of wiring regulations which, at present, greatly varied in different districts. Contractors had a duty to perform to the public, and any electrical work should be given to those who were members of a recognised association and were competent. Mr. H. Featherstone proposed " The Electricity Supply Industry," and said he felt that if all electrical engineers thought on the lines of Mr. Hoadley, the Maidstone engineer, the industry would be in a much happier position. Mr. Hoadley, responding, advocated the need for a national proving house. During the last three weeks he had had an interview with the Electricity Commissioners on this point and they were wholeheartedly in favour of the idea. He hoped with the support of the Commissioners and the various organisations in the industry that it would be possible to obtain legislation which would bring into being such a scheme. He trusted that the National Convention to be held at Bournemouth in June would bring about closer co-operation between the various branches of the industry.

Wages in the Cable-making Industry

The Joint Industrial Council for the Electrical Cable-making Industry informs us that there will be no " cost-of-living " alteration in wages on the third pay-day in March.

Local Exhibitions

An electrical exhibition was held from February 19th to the 23rd in the Spa Pavilion, Felixstowe, organised by the U.D.C. Electricity Department under the supervision of the electrical engineer, Mr. A. J. Waring. The main exhibit, staged by the Electricity Department, included cooking demonstrations which were given twice daily. One or two local electrical contractors had stands of general interest and there were also examples of an all-electric bedroom and bathroom. The Electricity Department had two stands, exhibiting on one all the electrical appliances which may be hired or hire-purchased by consumers, and on the other, which ran the length of the back of the Pavilion, a general display of appliances of all kinds, including agricultural equipment, refrigerators, fittings, appliances and fires. Each morning a special cooking demonstration was given for parties of children from the local schools who came with their teachers. In the afternoons and evenings more advanced electric cooking demonstrations were given. By night the Spa Pavilion was floodlighted by " Osira " colour floodlighting in red.

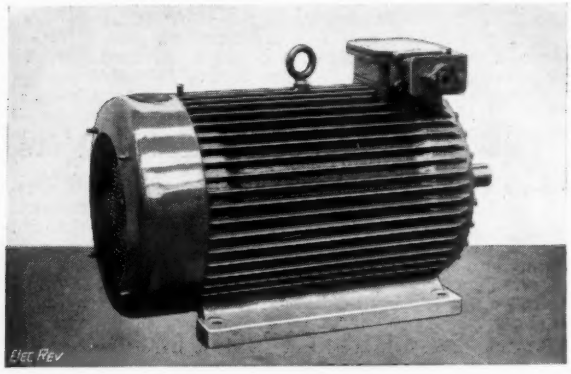
In the Birkenhead Municipal Exhibition, which opened on Wednesday last week, the Electricity Department has a display comparing an old-fashioned and a modern kitchen. In the former are an old washing copper, kitchen range and fireplace taken from a local house built in 1835, while the modern kitchen is equipped with electrical domestic appliances showing how electricity has changed the whole aspect of the home. An oil street lamp which was used in Neston 100 years ago hangs alongside an arc-lamp, a century-old iron presents a striking comparison with one of the new electric models, and an old copper warming pan is shown alongside a modern electric bed-warmer.

An electrical exhibition organised by the Bacup Corporation Electricity Department under the supervision of Mr. W. H. Metcalfe, borough electrical engineer, was opened recently by

Councillor Mrs. M. J. Parry. Councillor J. H. Hargreaves said that the number of consumers in Bacup in 1914 was 108, while last year the total was 2,887, the sales amounting to 5½ million kWh. A comprehensive display of domestic electrical appliances was arranged by a number of well-known electrical manufacturers, while local electrical contractors also co-operated.

Recent Contracts

Lancashire Dynamo & Crypto, Ltd., has received an order for twelve motors, ranging in outputs up to 60 h.p., for a new



A " Fankuld " motor to be installed in an oil refinery

oil refinery in this country. These machines are all of the flameproof " Fankuld " construction, squirrel-cage type, and are in each case covered by a Buxton test certificate. The motors will be used for driving centrifugal pumps. The accompanying illustration shows the type of motor to be installed.

The Sinterae Illuminating Co. has received an order from the London, Midland & Scottish Railway Co. for a " Sinterae " fog beacon to be erected at Tilbury. This beacon will be the first of its kind to be used for the purpose of navigation.

At the Vulcan Engineering Works of Fullerton, Hodgart & Barclay, Paisley, seven large electric winders are being constructed for South Africa. The winders, three of which are completed, are of imposing type, and the length of the vertical wind (6,500 ft.) is stated to be the deepest single stage in any mining activity. The drums have a maximum diameter of 30 ft., and the rope speed is 3,000 ft. per minute.

Among orders recently received by Messrs. Mirrlees, Bickerton & Day, Ltd., are a six-cylinder 720-b.h.p. airless injection engine for installation at the Dohad power station of the Bombay, Baroda and Central India Railway Co., a four-cylinder 480-b.h.p. airless injection engine for the Shikarpur Electric Supply Co., the fourth supplied to this company, a four-cylinder 560-b.h.p. airless injection engine for installation at the power house of the Armour Meat Packing Co., South America, and a third engine for the Mangrol State Electric Supply Co., Kathiawar.

A Public-address Equipment Showroom

In order to display to the best advantage the latest amplifying equipment supplied by Philips Industrial (Philips Lamps, Ltd.), a special showroom has been reconstructed and redecorated. Visitors may inspect and test for themselves the equipment designed to meet every conceivable require-

A new Philips public-address showroom

ment. Amplifiers for drawing rooms, small dance halls, cafés, etc., with their appropriate loud speakers, may be seen alongside larger models suitable for outdoor meetings, dirt tracks, sports stadiums, railway stations, and other applications. A comprehensive selection of speakers is shown, ranging from small units on attractive walnut baffles, for indoor use, to large horn speakers capable of dealing effectively with inputs up to 20 watts (undistorted).

" Coolicon " Shades

We have received from the Benjamin Electric, Ltd., an attractive folder in two colours with the title " Any Suggestions? " in which are reproduced eight special " Coolicon " mailing cards which were recently distributed to the electrical trade. Below them space is provided for suggestions for further cards, and the company is offering a guinea for every suggestion accepted. The folder also announces that during March the company will dispatch from its Tottenham works " Coolicon " shades bringing the total manufactured and dispatched up to 250,000, and an acknowledgment to the trade forms a further special communication which was to be issued yesterday (Thursday).

Ex-Siemens Men

A smoking concert is being held by the Association of Ex-Siemens Men on March 22nd at Gatti's Restaurant, King William Street, W.C. Particulars of the Association can be obtained by those qualified for membership on application to Mr. E. P. Barfield, " Elecfurn Works," North Road, Holloway, N., or Mr. R. Hornby, 7, Carlisle Street, W., joint hon. secretaries.

A Coiled-coil Lamp Display

The accompanying illustration shows a window display at the showrooms of the Sun Electrical Co., Ltd., Charing Cross Road, W.C. The main exhibit consists of Siemens coiled-coil pearl and opal lamps, while architectural lamps are also dis-

A lamp display at the showrooms of the Sun Electrical Co.

played. The main centrepiece with a " Big Ben " display makes an attractive window when illuminated, and an added attraction is a number of " Quad-ray " cubes containing Siemens colour-sprayed lamps operated by a flasher to produce an ever-changing colour scheme.

Batti-Wallahs' Luncheon

The next luncheon of the Batti-Wallahs' Society will be held on March 7th at the Hotel Metropole, when Professor G. T. R. Hill will deliver an address on " Flying." All tickets for the dinner and dance on March 15th have been sold, but further applications will be considered for tickets which may be returned.

Italian Glow Lamp Syndicate

With the co-operation of the Government the former Italian Glow Lamp Syndicate has been re-established by the compulsory inclusion of the outside and smaller producers. The large producers have now slightly raised prices and discontinued the sale of the second-rate, cheaper and inferior lamps which were introduced to meet the competition of outside firms.

Social Events

Nearly 500 employés were present at the fourth annual dinner of the South Wales Electric Power Co., which took place at Pontypridd on February 23rd. Mr. C. T. Allan (general manager) was in the chair, and he was supported by Ald. A. E. Gough (chairman of the Cardiff Corporation Electricity Committee) and Mr. R. Roper. The toast of " The South Wales Electric Power Co." was proposed by Mr. T. Bolan. Upper Boat. Responding, Mr. Allan said that there had been a big increase in the output of electricity during the past year; this indicated growing prosperity in South Wales. In the course of the proceedings a presentation was made by Mr. T. R. Kernick to Mr. J. C. Newman, who has been associated with the company for twenty-two years. The following sporting trophies were also presented: The C. T. Allan Golf Cup to Mr. C. H. Cossens; the Electric cup to Mr. D. Howitt; the S.W.P. Bowls Cup to the Hereford Club; the Legge Bowls

Cup to Mr. J. Seaton; and the R. Roper Cup to Mr. S. Booker.

The Taunton Corporation Electricity Department held its staff dinner and dance, attended by about 100 guests at the County Hotel, Taunton, on February 21st. Mr. L. Checkley-Barker, chairman of the Electricity Committee, presided, and welcomed the guests. During the evening Mr. E. J. Dowson (E.D.A.) proposed the "Electricity Department," to which Mr. Checkley-Barker responded, paying tribute to Mr. A. J. Howard, the manager of the electricity undertaking, and his staff, and referring to the success of the scheme for improved street lighting. The evening was concluded with a musical programme and dancing.

The annual staff ball of the North Metropolitan Electric Power Supply Co. will be held on March 8th at the Corner House, Coventry Street, Piccadilly, W.

The "Clesco" Light Operatic and Dramatic Club (County of London Electric Supply Co., Ltd.) presented "Elect-Tricks of 1935—A Revusical Show" at the Fortune Theatre, Drury Lane, W.C., last night (Thursday). Further performances are being given to-night and to-morrow night.

Trade Announcements

Messrs. Johnson & Phillips, Ltd., inform us that Messrs. Hodges & Taylor ceased to represent them in Hull and district as from January 1st last.

The Vacuum Drier and Chemical Equipment Co., Ltd., 66, Victoria Street, London, S.W.1, has recently been registered for the manufacture of vacuum pumps, condensers, vacuum driers, and evaporators, and other equipment for process work in the chemical, electro-technical and food packing industries generally. The company works in conjunction with the Deutsche Vacuumapparate G.m.b.H., of Erfurt, and their plant is based upon the designs, patents, and experience of that company. The whole of the material will be made by the Mirrlees Watson Co., Ltd., Glasgow.

International Glow Lamp Syndicate

It is announced from Zurich that an agreement has now been reached between the Continental Glow Lamp Syndicate and the lamp works of Zimmer and Zschocke, North Bohemia, and its branch in Usti. With the exception of a few small independent makers an understanding has now been reached with all the glow lamp works in Czechoslovakia.

A Cooking Exhibition

At the Universal Cookery and Food Exhibition in the New Royal Horticultural Hall this week there is an attractive Electrical Development Association stand in a central position, at which demonstrations of electric cooking are being given. In addition Carron Company is showing a new electric griller for resturant use. The Jackson Electric Stove Co., Ltd., exhibits a large chef's range with a total loading of nearly 15 kW.

The E.D.A. stand at the Cookery and Food Exhibition

A good selection of electric cooking equipment is exhibited by the Simplex Electric Co., Ltd., while the Peerless Electric Manufacturing Co., Ltd., shows mincers, choppers, beaters, coffee grinders, and similar appliances. An electric dish-washing machine is shown in operation on the Staines Kitchen Equipment Co.'s stand. The exhibition closes at 9 p.m. to-day (Friday).

For Sale

Salford Corporation has for disposal a 1,000-kW G.E.C. rotary convertor, complete with booster starting panel and step-down transformer.

Northampton Transport Department has for disposal ten motors.

Blackpool Electricity Department has for disposal a 1,250-kW turbo-alternator.

(See our classified advertisements.)

Bulgarian Lamp Production

The first glow lamps of Bulgarian manufacture have now been placed on the market. They are being made by the Balfa works under the guidance of German and Hungarian experts. The daily production amounts to 3,000 lamps.

Marlow Electrical Week

A series of lectures and demonstrations were given in the Church Hall, Marlow, recently by the Cookham and District Electricity Corporation, Ltd. The "Electrical Week" was opened by Lord Meston, Lady Moir and Miss Caroline Haslett,

Lord Meston, Lady Moir and Miss C. Haslett at the opening of Marlow Electrical Week

and on the following days lecture-demonstrations were given on lighting in the home, of particular interest to the housewife; decorative lighting, for architects; light as a sales force, for local tradesmen and staffs; and how lighting service assists the electrical industry.

Industrial Electrical Heating

Copies of a well-illustrated description of diverse applications of electric heat to varied industrial processes are obtainable from Messrs. Geo. Bray & Co., Ltd., Leeds, in the form of a reprint of a paper read by Mr. F. T. Nurrish before the Yorkshire Section of the Institution of Production Engineers.

Bournemouth Electrical Contractors' Dinner

Speaking at the annual dinner of the Bournemouth branch of the Electrical Contractors' Association on Tuesday last, the Mayor of Bournemouth (Ald. J. R. Edgecombe), expressed the hope that Great Britain would not follow the lead of the Continent and enforce the State control of industry. While the grid was not perhaps ornamental, it brought cheaper electricity to the whole of the country and the end would more than justify the means.

Sir Wm. Ray, M.P., said that the electrical industry was bound to progress. The question was would the contractors accelerate or retard that progress? This depended on how far the contractors were prepared to go to make England electrically minded. Mr. F. P. Dolamore (Bournemouth borough engineer) deplored the fact that unqualified contractors were allowed to tender for public schemes. If their's were the lowest tenders the governing bodies were compelled to accept them. Such an association as the E.C.A. should "rope in" all qualified contractors, which would be a step towards the time when all Councils would be compelled to let contracts to qualified contractors.

Price Reductions

The Chloride Electrical Storage Co., announces that it has reduced the prices of its Drydex "Texet" and "Red Triangle" batteries.

Irish Duties on Refrigerators

The Irish Free State Executive Council has, according to *The Times*, imposed a duty of 25 per cent. *ad valorem* on imported refrigerating or cold storage apparatus, apart from that used in dairies and creameries.

A Builders' Directory

The 1935 edition of Laxton's & Lockwood's Builders' Price Book (Kelly's Directories, Ltd., 10s. 6d. net), which has just been issued, has been revised to bring the prices up to date, and particulars of new products and processes have been included. In order to facilitate reference, the Roman figure pagination for the advertisement and indices sections has been discontinued, and the pages are now numbered consecutively throughout. The book is divided into trade sections, and includes information on, and prices of, builders' and contractors' plant, a section for electricians and lift engineers, and a number of useful tables and memoranda, while there is a very full index. The standard rates of wages for the building trades are given, including regradings which came into force on February 1st last, and the legal section has been brought up to date, as has also the list of proprietary articles and trade names.

An Industrial Electrical Exhibition

A demonstration of industrial electrical apparatus was held last week in the showrooms of the Coventry Corporation Electricity Department, in conjunction with Philips Industrial, It was opened by Councillor W. H. Malcolm, chairman of the Electricity Committee, who said that the showrooms had previously only displayed domestic electrical apparatus;

A display of industrial electrical equipment at Coventry

the demonstration of electricity for industrial purposes was a new departure for them. A view of the exhibition appears in the accompanying illustration which was sent us by Mr. W. J. Marston, the city electrical engineer.

Prices of Materials

The following prices are only general, and they may vary according to quantities and other circumstances.

CHEMICALS, ETC.	Price, February 27th.	Fortnight's Inc. or Dec.
a Acid, Oxalic ... ... per cwt.	50s.	—
a Ammoniac, Sal ... ... per ton	£40	—
a Ammonia, Muriate (large crystal) ... ,,	£38	—
a Borax ... ... ,,	£17	—
a Copper, Sulphate ... ... ,,	£19 15s.	—
a Potash, Chlorate ... ... per lb.	3¾d. to 4¼d.	—
a ,, Perchlorate ... ... ,,	6d.	—
a Shellac T.N. ... ... per cwt.	£4 18s.	—
a Sulphur Commercial... ... ... per ton	£11	—
a ,, Roll ... ... ,,	£11	—
a Soda Chlorate ... ... per lb.	3¼d. to 3¾d.	—
a ,, Crystals... ... ... per ton	£5 to £5 5s.	—
a Sodium Bichromate, casks ... ... per lb.	4d. nett.	—
METALS, ETC.		
b Aluminium, Ingots ... ... per ton	£100 to £105	—
b ,, Wire ... ... per lb.	1/1 to 1/9	—
b ,, Sheet and Foil... ... ,,	1/2 to 2/9	—
p Babbits Metal and Anti-friction Metals—		
Grade I ... ... per ton net	£198	£11 dec.
Grade II ... ... ,,	£136	£7 dec.
Grade III ... ... ,,	£70	—
c Brass (rolled metal 2" to 12" basis)... per lb.	6¼d.	—
c ,, Tubes (solid drawn) ... ... ,,	8¾d. to 9d.	—
c ,, Wire, basis ... ... ,,	7d.	—
c Copper Tubes (solid drawn)... ... ,,	9¼d.	—
g ,, Bars (best selected)... ... per ton	£56	£2 dec.
g ,, Sheet ... ... ,,		
g ,, Rod ... ... ,,		
d ,, (Electrolytic) Bars ... ... ,,	£30	10s. dec.
d ,, ,, Wire Rods ... ,,	£34 5s.	10s. dec.
d ,, ,, H.C. Wire ... per lb.	6⅛d.	⅛d. dec.
f Ebonite Rod ... ... ,,	1/6 to 2/—plus	—
,, Sheet ... ... ,,	1/3 to 1/6—10%	—
n German Silver Wire ... ... ,,	2/5	—
h Gutta-percha, fine ... ... ,,	nom.	—
h India-rubber, Para-fine ... ... ,,	4¼d.	—
i Iron, Pig (Cleveland No. 3)... ... per ton	62/6	—
i ,, Wire galv. No. 1, P.O. qual. ... ,,	£20	—
g Lead, English Pig ... ... ,,	£12 5s.	5s. dec.
g Mercury ... ... per bot.	£11 14s. to £11 15s.	—
e Mica (in original cases) small ... per lb.	6d. to 1/-	—
e ,, ,, medium ... ,,	5/- to 10/-	—
e ,, ,, large ... ,,	10/6 to 17/6 & up	—
p Phosphor Bronze, plain castings ... ,,	1/1	—
p ,, ,, drawn bars & rods ,,	10¾d.	—
p ,, ,, rolled strip & sheet ,,	10¾d.	—
p ,, ,, wire ... ... ,,	11¼d.	—
o Platinum ... ... per oz.	£7	—
d Silicum Bronze Wire ... ... per lb.	7¼d.	⅛d. dec.
r Steel, magnet, in bars ... ... ,,	7¾d.	—
g Tin, Block (English)... ... ... per ton	£214/15s. to £216/15s.	£14/12/6 dec.
n ,, Wire, Nos. 1 to 16 ... ... per lb.	3/8	—

Quotations supplied by :—

a G. Boor & Co.
b The British Aluminium Co., Ltd.
c Thos. Bolton & Sons, Ltd.
d Frederick Smith & Co.
e F. Wiggins & Sons
f India-Rubber, Gutta Percha and Telegraph Works Co., Ltd.
g "The Metal Bulletin."
h Edward Till & Co.
i Bolling & Lowe.
n P. Ormiston & Sons.
o Johnson Matthey & Co.
p C. Clifford & Sons, Ltd.
r W. F. Dennis & Co.

The above table is published here fortnightly. In alternate issues, in which it does not appear, the latest prices of copper, silicium bronze wire, lead and rubber, up to the time of going to press, are given in our "Business Notes" under the same heading.

New Catalogues and Lists

Price & Belsham, Ltd., Tamworth Lane Works, Mitcham.—A pamphlet on the latest type of portable load indicating cabinet.

W. C. Davey & Co., 176, Tottenham Court Road, W.1.—A leaflet dealing with a new patented cut-off relay.

The Marconiphone Co., Ltd., 210, Tottenham Court Road, W.1.—A radio catalogue and a copy of the "Marconiphone Mail."

Holophane, Ltd., Elverton Street, Vincent Square, S.W.1.—A list of Holophane-Edgcumbe auto-photometers which now cover all general requirements.

Fischer Bearings Co., 85, Milton Street, E.C.2.—A catalogue of "FAG" spherical roller bearings.

J. G. Smithson & Co., Ltd., Lifford Lane, King's Norton, Birmingham.—A pamphlet on patent trigger operated contactor controllers.

Osler & Faraday, Ltd., 89, Newman Street, W.1.—A brochure dealing with exhibits at the "British Art in Industry" Exhibition.

Electrical Equipment & Carbon Co., Ltd., 107, New Oxford Street, W.C.1.—A pamphlet on "Nevel" mercury arc rectifiers.

Switchgear & Cowans, Ltd., Old Trafford, Manchester.—Particulars of three-phase metal-clad oil immersed non-automatic switches and a colliery lighting fuse-switch transformer.

Marco Conveyor & Engineering Co., Rowin Works, Lynn Road, Leytonstone, E.11.—A complete catalogue of mechanical handling equipment.

Adam Hilger, Ltd., 98, King's Road, Camden Road, N.W.1.—A leaflet on the "Guild" flicker photometer head.

Marconi's Wireless Telegraph Co., Ltd., Victoria Embankment, W.C.2.—Booklets on types 22b and 33a short-wave receivers.

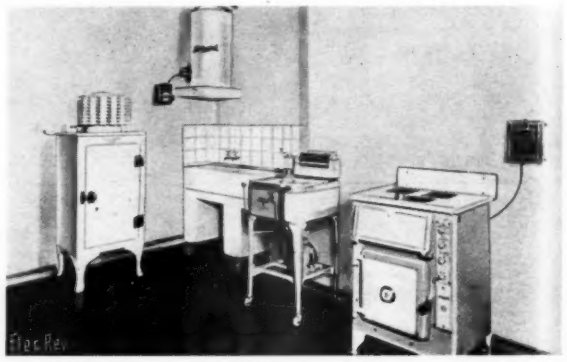
Gent & Co., Ltd., Faraday Works, Leicester.—A catalogue of "Pul-syn-etic" electric clocks and other "Tangent" products.

British Electric Transformer Co., Ltd., Bush House, Aldwych, W.C.2.—A booklet on a new capacity booster.

Hoover, Ltd., Perivale, Greenford.—A brochure describing the new Hoover "Junior."

Batteries, Ltd., Hunt End Works, Redditch.—A folder dealing with the "Nife" nickel-cadmium alkaline battery applied to traction work.

British Aluminium Co., Ltd., Adelaide House, King William Street, E.C.4.—Booklets on aluminium rod, alloys and sheet, strip and circles, and on the properties of aluminium.



The all-electric kitchen which has been constructed in the showroom of the Hotpoint Electric Appliance Co., Ltd., which includes a Hotpoint-B.T.H. cooker, a B.T.H. refrigerator, a washing machine, and a water heater

Siemens Electric Lamps & Supplies, Ltd., 38, Upper Thames Street, E.C.4.—A catalogue of Jubilee illumination equipment.

Bankruptcy Proceedings

R. S. Barlow, Chapel Lane, Spalding, electrical contractor and radio dealer.—The public examination herein was adjourned for closing recently at the Law Courts, Peterborough. The trustee said the previous hearing was adjourned for debtor's transactions with a finance company to be investigated. Debtor was questioned regarding those dealings. He said that in most of the villages in the Spalding district he had battery collecting agencies, which also held small stocks of flash-lamps and small goods. Those supplies were taken to them as required, and he received cash. His gross liabilities amounted to £2,278, of which £1,790 was expected to rank for dividend, and there were net assets of £969.

E. Howitt (trading as Howard & Co.), 368, South Road, Walkley, Sheffield, wireless dealer.—The public examination herein was held at the County Court Hall, Sheffield, on February 21st. Debtor said his liabilities amounted to £275, and he estimated his assets at approximately £72. He attributed his failure to small gross profits and restricted trade owing to lack of capital. The examination was concluded.

S. F. Philpott (S. F. P. Electrical Co.), electrical engineer, North Bar Works, Banbury.—Receiving order made February 15th on debtor's own petition. First meeting March 5th at 8, Forbury, Reading. Public examination April 3rd at the Town Hall, Banbury.

R. C. Radeglia, electric lamp dealer, 40, King William Street, E.C.—Receiving order made February 14th on a creditor's petition. Public examination April 9th at Bankruptcy Buildings, Carey Street, W.C.

C. Worden, electrical engineer and radio dealer, 5, St. Albans Road, Darwen.—Receiving order made February 15th on debtor's own petition. First meeting March 1st at the Official Receiver's Office, Blackburn. Public examination April 3rd at the County Court House, Victoria Street, Blackburn.

A. E. Humphreys, electrical engineer, 20, St. James Square, S.W.—Application for discharge to be heard on March 14th at Bankruptcy Buildings, Carey Street, W.C.

J. Keddie, electrician, 90, Leander Road, Brixton, S.W.—Last day for receiving proofs for dividend, March 6th. Trustee, Mr. S. W. Hood, Bankruptcy Buildings, Carey Street, W.C., Official Receiver.

M. Murray (Neon Sign & Metal Works), sign manufacturer, 49-51, Gough Street, Gray's Inn Road, W.C.—Receiving order made February 20th on a creditor's petition. First meeting March 6th, and public examination April 12th, both at Bankruptcy Buildings, Carey Street, W.C.

L. D. McDowall (Leslie's), radio dealer, 17, Upper Stone Street, Maidstone.—Trustee, Mr. F. H. Langmaid, 230a, High Street, Rochester. Official Receiver, released February 15th.

G. D. Whitham, electrical engineer, 36, Orford Lane, Warrington.—Trustee, Mr. P. S. Booth, 2, Bixteth Street, Liverpool, released February 7th.

J. Webster, electrical and radio dealer, 65, Moss Lane, Orrell Park, and 231, Warbreck Moor, Aintree, Liverpool.—Last day for receiving proofs for dividend March 8th. Trustee, Mr. C. E. Balmforth, 7-9, James Street, Liverpool.

G. W. C. Laws (C. & E. Laws), radio and electrical engineer, 9, Queen's Road, East Grinstead.—First and final dividend of 5d. in the £, payable February 27th at the Official Receiver's office, 8, Old Steine, Brighton.

Winding-up Petition

Wm. Akers & Co., Ltd.—A petition for the winding-up of this company has been presented to the High Court by Messrs. George T. Hall, Ltd., and will be heard in London on March 4th.

Company Liquidations

John Strohmenger & Sons, Ltd.—Meeting March 20th at 93, Goswell Road, E.C., to receive an account of the winding-up by the liquidator, Mr. K. P. Strohmenger.

Intensive Lighting, Ltd.—Particulars of claims by March 11th to the liquidator, Mr. H. Reynolds, 54, Finsbury Court, Finsbury Pavement, E.C.

R. Brightwell, Ltd.—Winding up voluntarily. Liquidator, Mr. W. A. J. Osborne, Balfour House, Finsbury Pavement, E.C.2. Particulars of claims to the liquidator by March 8th.

Looe Electricity Co., Ltd.—Winding up voluntarily. Liquidator, Mr. H. Fraser.

Private Arrangements

W. L. Cain, 41, Catherine Street and 80, Sandridge Road, St. Albans, and Redhill Road, Hitchin, wireless and electrical dealer.—A meeting of the creditors of the above was held recently at the offices of Mr. C. Latham, 73, New Oxford Street, London, W.C., when the statement of affairs showed ranking liabilities of £1,289 and net assets of £539, leaving a deficiency of £750. It was reported that the debtor commenced business at Sandridge Road, St. Albans, in 1927, with a capital of about £20 and traded at a profit until 1934, when the turnover fell to £2,808, and there was a net loss of £359. The drawings had been moderate. It was stated that the fall in the turnover last year was due to the competition in the district. Recently creditors had pressed and an execution was levied, but that had been withdrawn. A resolution was passed confirming a deed of assignment already executed to Mr. C. Latham, whilst a committee was also appointed consisting of the representatives of Messrs. Brown Bros., Ltd., Houghton Butcher & Co., Ltd., and Messrs. J. J. Eastick & Sons.

E. S. Raney, electrical contractor, "Minstan," Coldyhill Lane, Newby, Scarborough.—At a meeting of creditors a statement of affairs was presented showing ranking liabilities of £676 and fully secured creditors for £725. The assets were estimated to realise £158, leaving a deficiency of £517. It was reported that the debtor commenced trading as an electrician in March, 1931. At the outset he was in partnership, but a dissolution took place after six months. Since that date the debtor had traded alone. During the year to September, 1934, the turnover was £2,027, with drawings of £214, a net loss of £10 being sustained. An offer of a composition of 3s. 4d. in the £ was accepted.

Dissolution of Partnership

Thomas & Chadwick, electrical engineers and wireless salesmen, 52, Manchester Street, Heywood.—Messrs. W. Thomas and T. Chadwick have dissolved partnership. Mr. Thomas will attend to debts and carry on the business under his own name.

E.D.A. Luncheons

THE annual luncheon of the South-West England and South Wales (Northern) Area of the British Electrical Development Association was held at the Angel Hotel, Cardiff, on February 20th. "The Association and the South Wales Area Committee" was proposed by Mr. E. F. Bulmer, High Sheriff for Herefordshire, who said that all connected with electrical development should turn their attention to the working-class houses as being the most fruitful field for future sales.

He was not sure that the well-to-do were the best customers, because the working-class housewife had learned from experience the vast amount of labour she could be relieved of by the free use of electricity. Another source of business in which there was room for vast development was in the lighting of shops after hours.

Replying, Mr. A. C. Cramb (director of E.D.A.), dealt with the growth of the use of electricity since the war and said that there was no doubt that the two-part tariff was responsible in a large measure for the great increase in the sale of electricity, and next to this the facilities for hiring apparatus were responsible for the even larger increases that have since taken place.

Of the twelve million homes in this country, five millions were connected to an electricity supply and it was to the remainder that the electrical engineer had to look for the development of his business, while at the same time he believed that homes already connected could be made to increase their consumption four or five times.

Mr. D. Coe (chairman of the Area Committee) appealed for increased membership of E.D.A. The Mayor of Hereford (Coun. V. Shaw) also spoke and presented the area awards in the public speaking contest to Messrs. N. W. Slatter, of Hereford, and D. W. Bate, of Cardiff. Other speakers included Mr. A. Nichols Moore (deputy chairman, Area Committee), the deputy Lord Mayor of Cardiff, Captain J. Griffiths, and Ald. A. E. Gough, J.P. (chairman, Cardiff Corporation Electricity Committee).

At Bristol

The annual luncheon of the South-West England and South Wales (Southern) Area was held at the Royal Hotel, Bristol, on February 21st. The chairman (Mr. E. Jordan) presided, supported by the Lord Mayor of Bristol, Lord Methuen, Viscount Falmouth, and Lt.-Col. Sir Charles Miles.

Viscount Falmouth, submitting the toast of the Association, emphasised the great drive which had characterised its operations during the past year, which he attributed in no small measure to the improved organisation consequent on its amended constitution. It was from the small consumers that further expansion of sales must be expected. Mr. A. C. Cramb, in responding, said that the small householder was a vast potential field for development and he urged them to get busy and get on with it.

Mr. W. J. Bache (deputy chairman of the Area) submitted the toast of the visitors and guests and particularly emphasised the assistance which electrical development generally had received from the local and national Press. Mr. R. T. Lewis responded.

Prizes for the area public speaking competition were presented by the chairman to Miss Tucker, Miss M. K. S. Pavey (East Devon Co.), Messrs. A. C. Hazell (South Somerset Co.), and Mr. A. Smith (Wessex Electric Co., Yeovil).

Mid-East England

The annual luncheon of the Mid-East England Area was held in Leeds on February 20th, about eighty guests assembling at the Hotel Metropole. The principal speaker was Sir Harold Mackintosh, Bt., who said that he was particularly pleased to note that the Association was devoting its attention to complete electrical installations in small dwellings.

Sir W. Ray described the present activities of E.D.A., and said that he recognised the value of the work of Area Committees; he congratulated the Mid-East England Committee on its work during the past year.

Mr. R. S. Downe, chairman of the E.D.A. Council, submitted the toast of the Mid-East England Area, and remarked upon the remarkable growth in membership since 1929. He urged engineers to impress upon their staffs the need for being associated with the E.D.A. Conferences.

Mr. N. McLean, vice-chairman of the Area Committee, explained that Mr. T. Roles (chairman) was unfortunately indisposed. The area covered 7,500 sq. miles, and served a population of five million people. The output of electricity represented 300 kWh per head of the population. The prizes gained in the recent public speaking competition were then presented.

Central England Area

Ald. Sir Percival Bower, chairman of the Birmingham Corporation Electricity Supply Committee, speaking in Birmingham last week at the annual meeting of the Central England Area, said the greatest problem was distribution cost. If they could supply the customers at the cost of generation they might quickly get to the point which they wanted to reach. Referring to the high cost of putting cables underground, he said he was not prepared to agree that "pylons" erected with care would destroy the beauty of the countryside. It seemed to him that we must emulate the example of Continental countries, where the system had existed for many years.

Scottish Area

Sir James Lithgow proposed the toast of the Association at the annual luncheon in Glasgow on February 21st of the Scottish Area. He said that in the electrical industry Scotland was suffering from the handicap of a rather late start, and so when the supply was being developed it seemed to him that they would be doing quite a legitimate national service if they lent their aid to the development of a reasonable amount of local production of the articles that were to be used.

Sir William Ray, in reply, dealt with the many activities of the Association. He stated that in the past eighteen months they had spent in national and provincial advertising a sum of £50,000. A few months ago they had prepared three special films dealing with the electrical industry, and these had already been seen by 1,250,000 people. They would return shortly to advertisement in the Press, however, because by that means they reached a population which could not otherwise be reached. Councillor A. Munro, convener of Glasgow Corporation Electricity Committee, proposed the toast of the Scottish Area Committee, and the chairman, Mr. W. J. Cooper, replied.

Electricity Supply

Lighting, Domestic, Power

Argyllshire.—PLAN TO SUPPLY FOUR TOWNS.—The electrification of Campbeltown, Ardrishaig, Tarbert and Lochgilphead is within sight after three years of negotiations. It is understood that the Electricity Commissioners propose to grant powers to a private company with a capital of £250,000. Campbeltown Town Council has asked the company's engineer to visit Campbeltown to discuss the proposal.

Barnsley.—REDUCED CHARGE.—The 3d. weekly charge for hired wiring installations has been reduced by the Town Council to 2d., which, together with the 1d. reduction in the fixed charge already granted, makes the total charge 10d. per week instead of 1s.

Bradford.—DEVELOPMENT.—From April 1st, 1934, to February 16th last, the Electricity Department's sales increased by practically six million kWh compared with the corresponding period of 1933-34. To cope with the development it is proposed to erect a new sub-station at Thornbury at an estimated cost of £50,000. There is also to be a further change-over from d.c. to a.c. in the Whetley Hill district, estimated to cost £8,381.

The Market Hall, Birmingham, floodlighted by the City Electricity Department to celebrate the centenary of its opening

Brighton.—ELECTRIC SCHOOL HEATING.—The Education Committee has in the past opposed suggestions that schools should be heated by electricity, but the General Purposes Committee has passed a resolution that the Education Committee shall be requested to apply forthwith to the Board of Education for permission to heat the new school at Patcham by electricity by the same method as is to be adopted at the Whitehawk Schools.

MAINS EXTENSIONS.—Mains are to be extended by a mile at an estimated cost of £1,609.

NEW CABLES.—As it has proved necessary to renew a length of submarine cable from the Southwick power station across the Shoreham Harbour and dredging will be necessary, three additional 0.25-sq. in. 22-kV cables with pilot cores are to be laid, at a cost of £2,000, to provide for anticipated increase in the load.

NEW SUB-STATIONS.—The Electricity Commissioners have been asked to sanction a loan of £9,980 in connection with the erection and equipment of four new sub-stations.

Clitheroe.—PROPOSED REDUCTIONS.—The Corporation has stated that the question of amending tariffs for all zones within the Corporation's area is under consideration, and, if possible, reductions will take effect from April 1st.

Colwyn Bay.—CHEAPER ELECTRICITY.—The Town Council has amended its electricity charges as follows.—Urban area: Lighting reduced from 4½d. to 4¼d. per kWh; domestic power to be charged at 1d. per kWh for the whole amount consumed; shop-window lighting reduced from 2¼d. to 2d. per kWh; public lighting from 2¼d. to 2d. Rural area: Lighting charge reduced from 6½d. to 6d. per kWh; new charge for domestic power 1½d. per kWh.

Exeter.—LOAN.—The Electricity Committee has obtained sanction to borrow £5,000 for sub-station equipment and kiosks.

Girvan (Ayrshire).—WIRING COUNCIL HOUSES.—The Town Council is considering providing electrical facilities in 122 houses.

Glasgow.—£80,000 TRANSMISSION IMPROVEMENTS.—The increase in the maximum demand during the past two winters has been such as to indicate that the main transmission lines will be overtaxed in the coming winter. The Electricity Committee therefore proposes to lay five additional 20,000-V main lines, together with ancillary protective cables, &c., between the following points: Dalmarnock and Springburn; Dalmarnock and St. Andrew's Cross; Dalmarnock and Langside; Byres Road and Maryhill; and Maryhill and Port Dundas. The estimated cost is £80,000 (cables £61,000 and switchgear £19,000).

MAINS EXTENSIONS.—The Electricity Committee has agreed to distributing mains being laid at a cost of £7,924.

Godstone.—SUPPLY BY OVERHEAD LINE.—The Rural District Council is not objecting to the use of overhead lines near Shipley Bridge, Burstow, by the Horley & District Electricity Co., Ltd.

Halifax.—HOUSEHOLDERS' TARIFF.—A new tariff for householders has been recommended by the Electricity Committee as follows: A fixed annual charge of 15 per cent. on the first £35 of the rateable value of the property (with a minimum annual fixed charge of £1 10s.) and 10 per cent. of the remainder up to a maximum annual fixed charge of £10, plus 0.5d. per kWh for the first 250 kWh per quarter, and all in excess at 0.4d. per kWh.

Hebburn-on-Tyne.—PROPOSED ELECTRIC LIGHTING SCHEME.—Estimates are being prepared of the cost of installing electric lighting in houses on an estate at present served by gas.

Hollingbourne (Kent).—SUPPLY TO LEEDS.—The Rural District Council has sanctioned the application of the Kent Electric Power Co. for permission to carry a supply *via* overhead lines to Leeds (Kent).

Hornsey.—SUB-STATION.—The Town Council is to erect a sub-station in Creighton Avenue, Muswell Hill.

Ilton (Somerset).—PROPOSED SUPPLY.—The South Somerset & District Electricity Co., Ltd., proposes to extend its mains to supply Ilton.

Inverness.—INCREASED OUTPUT.—The electrical engineer reports that the amount of electricity generated during 1934 was 3,466,803 kWh, an increase of 21.6 per cent. over the previous year. Since the works were taken over by the burgh in 1927 the energy generated yearly has increased two and a half times.

Irish Free State.—CORK.—At a meeting of the Cork County Council last week a resolution was passed in favour of all electricity undertakings in the county being taken over by the Electricity Supply Board.

Italy.—ELECTRICITY OUTPUT IN 1934.—The output of electricity in Italy during 1934 is estimated at 11,883,934,000 kWh as compared with 11,062,116,000 kWh in 1933, an increase of 7.43 per cent.

Kettering.—BARTON SEAGRAVE CHARGES.—The part of Barton Seagrave which has recently been added to Kettering is to be charged for electricity on the basis of the tariffs at present applicable to the Urban District.

A QUESTION OF DISCOUNT.—Messrs. Arthur E. Guest, Ltd., contractors for the erection of 102 houses on the Piper's Hill estate, contemplate seeking a settlement by arbitration of their claim for certain discount deducted by the Electricity Department.

LIGHTING EXTENSION.—Pytchley Road and the main road through Barton Seagrave are to be included in the scheme for the extension of the new system of central street lighting.

CHARGING VEHICLE BATTERIES.—In common with several other Electricity Departments, Kettering is to have a special tariff for charging electric vehicle batteries. A price of ½d. per kWh has been fixed for off-peak supplies restricted by time-switch to hours other than from 3 to 7 p.m. or during such other hours as may be arranged.

Lanarkshire.—SUPPLY IMPROVEMENTS.—Proposals of the Clyde Valley Electrical Power Co. to improve and extend electricity supplies in many districts in Lanarkshire, at a cost of several thousand pounds, have been approved by the County Council.

TENANTS PROTEST AGAINST BAN.—In Uddingston and Bothwell resentment is felt at the decision of the Lanark County Council not to withdraw the restrictions governing the introduction of electricity to Council houses on the ground that the County gas undertaking cannot afford to lose any further consumers. The tenants contend that this decision, which was reached by a majority of one, was taken after the suspension of two members of the Council and should not be allowed to stand.

Leicester.—£20,000 LOAN.—Sanction is sought by the Electricity Committee to a loan of £20,000 for sub-station equipment.

Lichfield.—PROPAGANDA.—An extensive campaign to make better known the advantages of electricity is to be launched by the Council. This will include seventeen film displays, Press advertisements for twenty-six weeks, and the erection of illuminated advertising boards. All cookers hired for one year are to be installed without charge up to a distance of 30 ft. from the meter; storage water heaters, with a capacity of 1½ gal., are to be hired out at a rental of 3s. per quarter and installed without charge. The present charge for cooking in business premises has been reduced from 1½d. per kWh to 1d., and for heating from 1½d. to 1d., and occupiers of small houses are to be supplied at a flat rate of 1d. per kWh for all electricity for cooking, heating, and water-heating purposes through a slot meter.

London.—L.C.C.—The Council is to improve the lighting of the Albert Embankment by the substitution of electric-discharge lamps for gas lamps. The cost is estimated at £770, and the work is being carried out by the South London Electric Supply Corporation, Ltd.

METROPOLITAN WATER BOARD.—The Board recommends a further expenditure of £1,794 for overhauling the electrical system at the head offices in accordance with recommendations of Mr. A. Murray Coombs, the consulting electrcial engineer.

ST. PANCRAS.—It is proposed to make application to the Electricity Commissioners for loans of £760 for l.v. switchgear at the Malet Place sub-station; £1,068 for switchgear at the Aldenham Street station; £1,801 for a new sub-station and an a.c. supply in the south-east borough; and £1,726 for a supply in the neighbourhood of the Euston telephone exchange. The Electricity Committee has recommended the Council to adopt the powers contained in Section 48 of the Electricity (Supply) Act, 1926, enabling it to sell electrical fittings.

Mains are to be extended at a cost of £1,425 in various roads.

STOKE NEWINGTON.—Application is to be made by the Electricity Committee for loans of £5,000 for meters and £5,000 for "free" wiring installations.

A supply is to be provided to sixty-six flats at Strouds Nurseries, Green Lanes (£1,669).

Milngavie.—ELECTRIC LIGHTING.—The Town Council has come to an arrangement with the Strathclyde Electricity Supply Co. regarding the installation of electric lighting in Council houses.

Nelson.—SUPPLY EXTENSIONS.—The Electricity Committee is considering a scheme to supply electricity to Roughlee, Newchurch-in-Pendle and Barley.

Norwich.—REWIRING OF INSTITUTION.—The Public Assistance Committee proposes to rewire part of its Institution at an estimated cost of £600.

Pembury (Kent).—STREET LIGHTING.—The Parish Council is to extend its street-lighting system at a cost of £250.

Preston.—ELECTRIC CHURCH CLOCKS.—The Parish Church now has an electric turret clock. The chimes and striking are automatically stopped from 10 p.m. until the next morning. Other smaller clocks have been fitted in various parts of the church, all of which are under the control of the "Pul-syn-etic" master clock.

Rushden.—STREET LIGHTING.—The Urban District Council proposes to light the whole of the main road from the Higham Ferrers boundary to Manning's Lane by centrally suspended lamps, and tenders are to be invited for the erection of fifty-one standards.

Scotland.—UNTAPPED ELECTRICITY SOURCES.—The opinion that the unharnessed lochs of Northern Scotland contain a sufficient head of water to develop 1,400,000,000 kWh of electricity a year was expressed recently by Mr. A. E. McColl, manager for Scotland of the Central Electricity Board, at a meeting of the Electrical Society of Glasgow held recently.

South Cambridgeshire.—ELECTRICITY FOR COUNCIL HOUSES.—The Rural District Council has decided that where more than half of the tenants of houses on a Council estate require electricity the whole of the houses on that site shall be wired, 2d. a week being added to the rent.

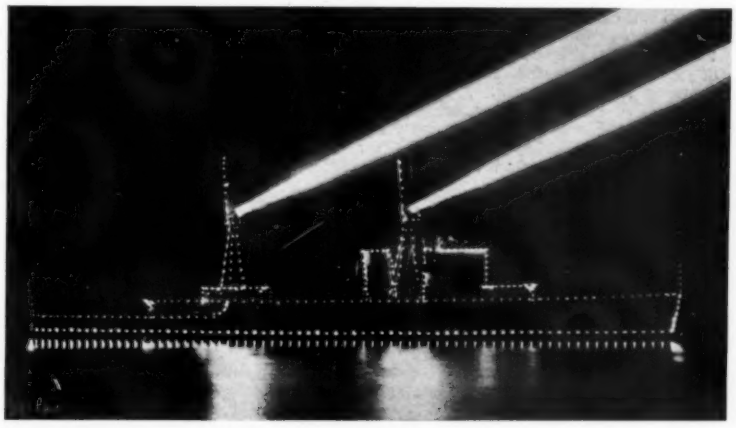
Sutton Coldfield.—SUPPLY TO ESTATES.—Schemes are being prepared by the Electricity Department for the provision of a supply to the Edge Hill estate and to 1,000 houses proposed to be erected on the Somerville estate.

Swansea.—LOAN FOR METERS.—The Electricity Committee is seeking sanction to borrow £20,000 for meters.

Thirsk (Yorks).—ELECTRICITY IN VILLAGES.—It was reported to Thirsk Rural District Council that the North-Eastern Electric Supply Co., Ltd., had written a letter stating that, so far as Knayton and various other villages are concerned, the cost of supply would be £2,500, and the estimated revenue would not justify the expenditure. The company also stated that it was reviewing schemes previously prepared to see if they would be self-supporting. At a meeting of the Council it was claimed that there were outlying villages which were in urgent need of a supply, and the Council decided to press the company to afford the required supplies.

Wimbledon.—ANNUAL REPORT.—Another successful year is reported by Mr. A. E. McKenzie, chief engineer and manager of the municipal electricity undertaking. The sales of electricity increased during 1934 by 17.17 per cent., to 43,608,804 kWh, which is 343 kWh per head of the population. The average domestic consumption was 1,093 kWh. The cost per kWh sold fell from 1.234d. to 1.039d. per kWh, and revenue from 1.32d. to 1.225d. per kWh. The maximum demand increased from 16,600 kW to 18,260 kW, and the number of consumers from 28,122 to 30,928. A supply is given to 95 per cent. of the buildings in the area of supply.

York.—STONE-THROWING NUISANCE.—The supply of electricity to a large portion of the rural area was interrupted recently as a result of insulators being broken on the line near the roadway at Warthill. It appears evident that the damage was caused by stone-throwing, and, in consequence, the Electricity Committee has issued notices offering a reward for information leading to the conviction of persons damaging the equipment.



The sloop "Alfonso de Albuquerque," built for the Portuguese Government by R. W. Hawthorne Leslie & Co., Ltd., "dress lighted" by 1,300 G.E.C. "Osram" lamps at Hebburn-on-Tyne

Plans for the Jubilee Celebrations

Further details of preparations in various towns for celebrating the Royal Jubilee have come to hand:—

The roof of Westminster Abbey is to be flood-lighted with Holophane equipment, while illuminations will also form part of the celebrations at Wigan, Redcar, Southampton, Wallasey (where the Town Hall will be floodlighted in colours and other prominent buildings in white), Leicester, and Eastbourne. In the last mentioned town the Electricity Committee is applying for sanction to spend £1,000 for illuminations. A pamphlet has been prepared and is being circulated to all hotel and boading house proprietors as well as to banks, business premises, etc., and the electricity showrooms serve as a central information bureau. The schemes so far prepared include: Floodlighting the Town Hall, Technical Institute and Art School, and the War Memorial in colour; floodlighting the Carpet Gardens, and festooning 1½ miles of sea front as well as several miles of streets leading to the promenades, and the flagstaffs on the sea front. In addition, flags and suitable medallions and signs in coloured lights are to be erected on Electric House, the Town Hall, and other principal buildings, including a large sign 150-ft. in length to be suspended over an important thoroughfare. To assist consumers in providing an attractive display the Electricity Committee has approved a special tariff of ½d. per kWh for outside decorative lighting, with a special rate of 2d. per kWh for such lighting, for the remainder of the season.

Of the £1,000 allocated by Weymouth Town Council for the celebrations, £782 will be spent on lighting equipment. The Leeds Electricity Department will grant special terms for the supply of energy and Skipton Electricity Department is to provide a supply without charge. The Liverpool Electric Supply Committee has agreed that there shall be no charge for the installation of meters for Jubilee illuminations, and that electricity shall be charged at ½d. per kWh. Floodlighting of the Town Hall, St. George's Hall and other public buildings is to be carried out. Clitheroe Electricity Committee has authorised reductions in charges for electricity supplied during the Jubilee week for shop window lighting and general illuminations, and the City Hall at Hull is to be floodlighted.

In Scotland the Dundee Corporation is planning to floodlight a number of prominent buildings, while Mr. E. Seddon, engineer and manager of the Edinburgh undertaking informs us that from May 3 to 12, there will be special floodlighting displays; among the buildings to be illuminated are the Castle, the National Monument, the Nelson Column, Register House, Scott Monument, St. Giles' Cathedral tower, St. George's dome, and the University dome. The Electricity Department has been asked to reduce the charge for lighting for this purpose.

A *Reuter* message states that floodlighting the whole of the Rock of Gibraltar, with the help of naval and military searchlights, is under consideration.

On page 232 of our issue of February 15th, where mention was made of the hiring out of projectors for Jubilee illuminations, it was stated that 1,000 W projectors were hired out by the Strand Electric & Engineering Co., Ltd., at 8s. 6d. per week. This figure, however, relates to flood lanterns for indoor stage use, not exterior service. We are informed that the correct figure for equipment for exterior work is several times the amount mentioned.

Traction

Glasgow.—Subway Inspection.—The Transport Department has been informed by the Ministry of Transport that two of the senior officials of the Ministry will visit Glasgow on March 3rd to make a preliminary inspection of the work in connection with the subway electrification. Part may be brought into use as an electrified service towards the end of March, but it is stated that at least nine months will elapse before the remainder can be passed for traffic.

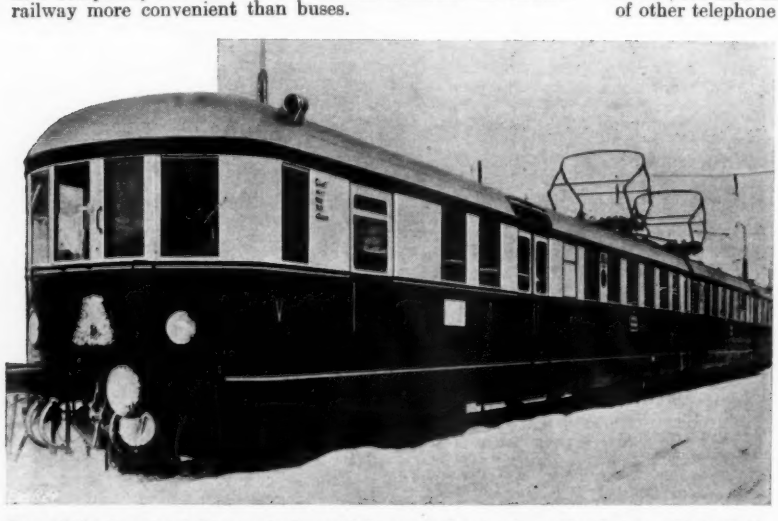
Hull.—Transport Deficit Inquiry.—The Transport Committee has appointed a sub-committee to inquire into a deficiency of £23,886 on the transport undertaking last year.

Liverpool.—Tramway Extensions.—According to the *Liverpool Post*, the following tramway improvement works have been approved by the Transport Committee: Extensions along Utting Avenue East to Lowerhouse Lane and along Townsend Avenue to its junction with the East Lancashire Road; along the East Lancashire Road to Lowerhouse Lane; along Lowerhouse Lane to Muirhead Avenue East; and along Muirhead Avenue East to the present terminus in Muirhead Avenue; a new line to be constructed from the Knotty Ash area along Brookside Avenue, Thomas Lane, and Edge Lane Drive, joining up with the Bowring Park route; the Mather Avenue line to be linked up with the Garston line and extended to serve the airport; the Mill Street line to be extended along Beloe Street to a junction near the Dingle terminus; the track to be extended from Wavertree Clock Tower to the Five Ways at Queen's Drive; greater use to be made of Tithebarn Street and Chapel Street, the lines in which are to be doubled.

South Africa.—Johannesburg Transport Proposals.—The City Council has approved the proposals of the Tramways and Lighting Committee for the improvement and reorganisation of the transport system based on the recommendations of the recent commission. The decisions involve withdrawing the tramcars on a number of routes and the substitution of omnibuses; running trolley-buses on the Orange Grove and Norwood Route; doubling some tramway track at a cost of £38,350; and laying new tramway lines, at a cost of £32,400, to cope with native traffic. On one route the tramway service is to be restored and interworked with another route. Tramway and omnibus workshops are to be separated. Arrangements are to be made for the institution of check meters on the electricity supply. A number of new appointments are to be made, including a transport engineer at a salary of £900 per annum, rising to £1,200, this position being advertised overseas; and a traffic superintendent at £850 to £1,000 per annum, which will be advertised overseas if no suitable candidate is forthcoming locally. Application is being made to the Provincial Administrator for permission to borrow £191,630 for new equipment, including £90,000 for the trolley-bus installation, twenty-two vehicles being required.

Southern Railway.—Electric Line to Leatherhead.—Work is shortly to be put in hand on the first section of the new electric line from Motspur Park to Leatherhead. This portion is four miles long and extends from Motspur Park to Garrison Lane, near Chessington. There will be stations at Old Malden, Tolworth and Chessington (Moor Lane and Garrison Lane), each with 520-ft. island platforms. Formal consent of the London Transport Standing Joint Committee has not yet been given, but, subject to its consent, the directors of the company have authorised the expenditure of the £440,000 which the scheme will cost.

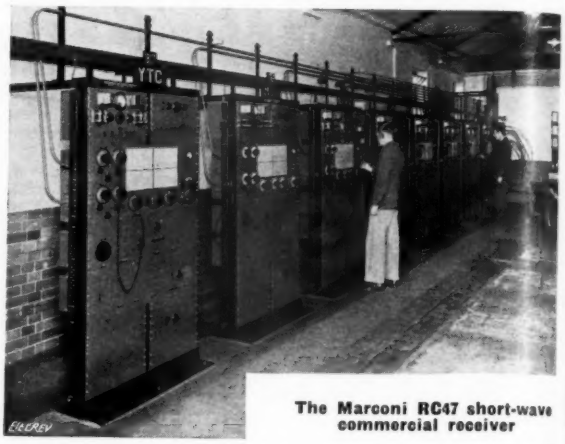
Swansea.—Opposition to South Wales Bill.—The Borough Council is to oppose the South Wales Transport Co.'s Bill, in which it is proposed to abandon the Mumbles Light Railway, now completely electrified. The Council considers the electric railway more convenient than buses.



One of the twenty-eight new trains which are to be used on the German State Railways electrified lines in Southern Germany, Silesia and Central Germany. The maximum speed of 75 m.p.h. can be attained 80 seconds after starting

Communications

Brentwood.—A Modern Commercial Receiver.—A bank of eight Marconi short-wave receivers (type RC.47) has recently been installed at the Brentwood receiving station of Cable & Wireless, Ltd., for the reception of long-distance telegraph services. These receivers are used in conjunction with "diversity" aerials to reduce fading. Each unit consists of:



The Marconi RC47 short-wave commercial receiver

Control panel (top right); tone sender panel (top left); aerial input, signal frequency amplifier, first detector, and first heterodyne (second panel); first intermediate-frequency amplifier, attenuator, second detector, and second heterodyne (third panel); second intermediate-frequency amplifier and final detector (fourth panel); and aerial switching oscillator (bottom panel).

Great Britain.—The B.B.C.'s Annual Report.—The annual report of the British Broadcasting Corporation again shows a substantial increase in revenue over the previous year, the total of £2,058,983 being £206,808 more than in 1933. This enabled the Corporation to continue the development of programmes, which had been retarded in consequence of the emergency contribution to the Exchequer. Of the increased income, £41,888 was allocated to engineering works. The gross receipts from licences amounted to £3,369,000, of which the B.B.C.'s share was £1,597,285. A sum of £334,958 was spent on plant maintenance, power, salaries and expenses of the engineering staff, development and research. Schemes including the construction and equipment of high-powered transmitters in North-East Scotland and North-East England were delayed, and will be a capital charge on 1935. Other schemes under consideration include the erection of more adequate regional studio premises and the extension of headquarters in London, the provision of a more powerful Empire service, and low- or medium-powered transmitters in North Wales and in the West, South, and East of England.

London.—Telephone Sales Office.—A consulting bureau for telephone users was opened by the Postmaster-General at Armour House, St. Martin's-le-Grand, London, on Tuesday. On the ground floor information may be obtained regarding the type of telephone installation best suited to particular requirements, &c., while demonstrations take place on the first floor. In opening the City Telephone Sales Office, as it is called, Sir Kingsley Wood said that one of the new developments, the auto-dial, permitted a subscriber to choose a number of other telephone users with whom he wished to communicate frequently, and to get into touch with them merely by pressing a lever. A second innovation was a new type of house telephone system which enables callers to be put through from one extension to another, or from any extension to the public exchange system, simply by pressing a button. Further, an automatic time signal had been introduced to indicate when the three-minute period was completed, while a "talking" clock had been devised which would automatically announce the correct time to a London subscriber.

Scotland.—Radio Guidance for Aircraft.—Highland Airways, Ltd., in a letter to the Shetland County Council, point out the necessity for radio guidance for aircraft flying over the dangerous tract of sea from Orkney to Shetland, and state that the Air Ministry has expressed its willingness to establish mobile radio stations at Inverness, Kirkwall, and Sumburgh, in Shetland, provided the local Councils meet one-tenth of the annual expenditure for the upkeep of each station, amounting to £1,000. The County Council is favourably inclined towards the scheme.

Contract Information

When "Contracts Open" are advertised in our "Official Notice" pages the date of the "Electrical Review" containing the advertisement is given in parentheses below

Contracts Open

Alfreton.—March 12th. U.D.C. Electric pumping machinery in connection with the supplementary water supply from Lea Hall. Particulars from Elliott & Brown, engineers, Burton Buildings, Parliament Street, Nottingham (deposit £3 3s.).

Argentina.—BUENOS AIRES.—State Railway Administration. April 29th. Twenty electrical train heating equipments. (A.Y. 12932.)*

Australia.—MELBOURNE.—Posts and Telegraphs Department. April 30th. Private automatic branch exchange telephone equipment. (A.Y. 12940.)*

Barking.—March 26th. County of London Electric Supply Co., Ltd. Steel frame buildings in connection with Barking power station extensions. (February 22nd.)

Beckenham.—March 25th. Electricity Department. Meters for one year. (See this issue.)

Bexhill.—March 8th. Electricity Department. L.p. metal-clad switchboard. (See this issue.)

Bridgend.—March 5th. U.D.C. Wiring of houses under assisted wiring scheme for twelve months. Specifications, &c., from the electrical engineer, Council Offices, "Glanagwr"; tenders to J. T. Howell, clerk to the Council, Court Road.

March 18th. Electricity Department. Transformers, switchgear, e.h.p. overhead and l.p. lines, &c. (February 15th.)

Bristol.—March 13th. Electricity Department. E.h.p. and l.p. switchgear, and e.h.p. transformer pillars. (See this issue.)

Cardiff.—March 11th. R.D.C. Meters for the year ending March 31st, 1936. (February 22nd.)

March 13th. City Council. One electrically driven main sewage pumping unit at the Western District pumping station. Specifications, &c., from the city engineer, City Hall; tenders to the town clerk.

Cheadle & Gatley.—March 18th. Electricity Department. Extension to existing e.h.p. switchgear. (See this issue.)

Chesterfield.—March 14th. Electricity Department. One 500-kW glass bulb rectifier equipment, e.h.p. and l.p. cables. (See this issue.)

Clacton.—March 6th. Electricity Department. Cable. (February 22nd.)

Cleethorpes.—March 11th. Electricity Department. Electrical materials for the year ending March 31st, 1936. (See this issue.)

Denbigh.—March 30th. North Wales Counties Mental Hospital Committee. Steam-driven d.c. electric generator and the addition of a new generator panel to the existing switchboard. Applications for tender forms to the clerk to the Visiting Committee by March 2nd (deposit £5).

Dover.—March 4th. Corporation. Meters, transformers, and cables for the year ending March 31st, 1936. (February 15th.)

Dundee.—March 14th. Electricity Department. Three-core e.h.p. and multicore cable. (See this issue.)

East and West Ardsley.—March 16th. U.D.C. Electric lamps for twelve months ending March 31st, 1936. Particulars from F. A. Brown, Council Offices, Blackgate, Tingley; tenders to the clerk to the Council.

Eastbourne.—March 14th. Corporation. Electric lighting and heating installation and wiring work on the Grand Parade improvement scheme. (See this issue.)

Edinburgh.—March 14th. Electricity Supply Department. One year's supply of electrical materials. Specifications, &c., from the engineer and manager's office, Dewar Place; tenders to town clerk.

Egypt.—CAIRO.—Ministry of Public Works. March 28th. 11,000-V cable and switchgear. (A.Y. 12939.)*

April 20th. Ministry of the Interior. Electrical equipment for the extension of the distribution system at Minia. (A.Y. 12938.)*

Epsom & Ewell.—March 18th. Electricity Department. 11,000-V e.h.p. cable and eight-core pilot cable. (See this issue.)

Erith.—March 4th. Electricity Department. Electrical accessories for the year ending March 31st, 1936. (February 15th.)

Exeter.—March 5th. Electricity Department. Twelve months' supply of service cut-outs and link-disconnecting boxes. (February 22nd.)

Farnworth.—March 9th. Electricity Department. Materials for the year ending March 31st, 1936. (February 22nd.)

Great Crosby.—March 9th. U.D.C. Electric lamps during the year ending March 31st, 1936. Specifications, &c., from J. A. Wright, surveyor, Town Hall; tenders to the clerk of the Council.

Great Yarmouth.—March 23rd. Electricity Supply Department. Stores and materials for the year ending March 31st, 1936. (See this issue.)

Hastings.—March 18th. Electricity Department. Cable supplies for the year ending March 31st, 1936. (February 22nd.)

March 21st. Electricity Department. Electric cookers for one year. (See this issue.)

Huddersfield.—March 9th. Corporation. Cable for a period of two years. (See this issue.)

Keighley.—March 14th. Electricity Committee. One year's supply of cables. Specifications, &c., from H. Webber, Electricity Offices, Coney Lane; tenders to the town clerk.

Kilmarnock.—March 21st. Town Council. Electric lamps for the year commencing May 16th. Particulars from the burgh surveyor, Market Bridge.

Kirriemuir.—March 4th. Town Council. Various works, including electric lighting, at housing scheme. Schedules from J. S. Bruce, burgh surveyor (deposit 10s.); tenders to town clerk.

Leyton.—March 11th. Electricity Department. Cables for one year from April 1st next. (February 22nd.)

London.—STEPNEY.—March 4th. H.p. and l.p. cable for the year ending March 31st, 1936. (February 15th.)

HACKNEY.—March 27th. Electricity Department. Meters, demand indicators, cables and flexible cords. (February 22nd.)

Commissioners of H.M. Works. March 7th. Electric lamps. (February 22nd.)

Manchester.—March 8th. Electricity Committee. Two 10,000-kVA transformers, 33,000-V, 500,000-kVA breaking capacity switchgear, and three grit arrestors. (February 22nd.)

March 21st. Electricity Committee. Twelve months' requirements of cables and service cut-outs. (See this issue.)

Middlesex.—March 18th. County Education Authority. Electrical installation in school for girls. (February 22nd.)

Morecambe & Heysham.—March 18th. Electricity Department. Electrical materials for the year ending March 31st, 1936. (See this issue.)

New Zealand.—WELLINGTON.—Public Works Department. June 4th. 110-kV outdoor switchgear, steelwork, &c. (A.V. 12926.)*

June 18th. 110-kV and 50-kV insulating push-rods. (A.Y. 12927.)*

Oswestry.—March 16th. Electricity Department. Materials for the year ending March 31st, 1936. (See this issue.)

Porthcawl.—March 8th. Board of Management. Electrical wiring for lighting and heating at the Porthcawl and Southerdown "Rests." Specifications, &c., from, and tenders to, J. L. Newman, secretary, The "Rest" (deposit £5 5s.).

Portland.—March 9th. Electricity Department. A.c. meters and cable. (February 22nd.)

Rhondda.—March 29th. Meters, copper wire, joint boxes, &c., for the year ending March 31st, 1936. (February 22nd.)

South Africa.—CAPE TOWN.—March 27th. Electricity Department. 4,000 four-pin sockets and plugs for use on electric ranges. (A.Y. 12921.)*

March 20th. Cable. (A.Y. 12936.)*

April 3rd. Electricity Department. Electrically driven sewage pumping plant. (G.Y. 14824.)*

Southampton.—March 19th. Electricity Department. Extensions of 6,600-V switchgear with reactors, &c. (See this issue.)

Stoke-on-Trent.—March 13th. Electrical Engineer's Department. Switchgear, transformers, cable, meters and motors for twelve months. (See this issue.)

Wakefield.—March 5th. West Riding Public Assistance Committee. Electric wiring at the Poor Law Institution, Gigglewick. Specifications from the West Riding architect, County Hall; tenders to J. C. McGrath, clerk of the County Council, County Hall.

March 16th. West Riding Public Health and Housing Committee. Various works, including electrical, at the new maternity home, Wickersley. Specifications, &c., from the West Riding architect, County Hall; tenders to the clerk of the County Council.

Walsall.—March 5th. Electricity Department. Medium-pressure distribution accessories, transformers and switchgear. (February 15th.)

March 16th. Walsall and West Bromwich (Barr Colony) Joint Board. Six months' supply of electrical fittings from April 1st. Particulars from the clerk and steward of the Institution, Great Barr Park Colony; tenders to the clerk to the Board.

Watford.—March 11th. Electricity Department. 6,600-V three-phase switchgear. (February 22nd.)

Westhoughton.—March 18th. U.D.C. Electric lamps for one year ending March 31st, 1936. Particulars from G. Hayes, surveyor; tenders to clerk of the Council.

Wetherby.—March 7th. R.D.C. Single-phase electric motor and centrifugal borehole pump for Sicklinghall pumping station. Particulars from F. J. Rodwell & Son, 37, Prudential Buildings, Leeds (deposit £1 1s.); tenders to the clerk to the Council.

Willesden.—March 13th. Electricity Department. Materials for the year ending March 31st, 1936. (See this issue.)

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* Further particulars can be obtained at the Department of Overseas Trade (Inquiry Room), 35, Old Queen Street, S.W.1.

Contracts Closed

Barnes.—Town Council. Accepted. 500-kW bank of rectifiers, with transformer, induction regulator, &c. (£2,750).—Hewittic Electric Co., Ltd.

Bedford.—Electricity Committee. Recommended. Two transformer kiosks at Kempston (£329).—British Thomson-Houston Co., Ltd. Switchgear (£1,091).—British Electric Co., Ltd.

Accepted. Electric lighting and power installation at the Bronham Colony.—C. F. Williams (Farnham).

Bexhill.—Electricity Committee. Recommended. Switchgear (£160).—A. Reyrolle & Co. Ltd. 300-kVA transformer (£168).—British Electric Transformer Co., Ltd.

Brighton.—Electricity Committee. Recommended. V.r. cables for twelve months (£590).—Hackbridge Cable Co., Ltd.

Health Committee. Accepted. X-ray outfit for sanatorium (£535).—Solus Electrical Co.

Croydon.—Electricity Committee. Accepted. Battery (£1,243).—Tudor Accumulator Co., Ltd. Battery charging set (£363).—Crompton Parkinson, Ltd. Switchgear (£187).—Metropolitan-Vickers Electrical Co., Ltd.

London.—ST. PANCRAS.—Contracts and Stores Committee. Recommended. Switchgear for the Northcourt sub-station.—A. Reyrolle & Co., Ltd. (£575); English Electric Co., Ltd. (£813). Switchgear and kiosk at the Ossulston sub-station (£643).—A. Reyrolle & Co., Ltd. Overhaul of e.h.p. switchgear at the Arlington Road sub-station (£125).—General Electric Co., Ltd.

STOKE NEWINGTON.—Electricity Committee. Recommended. Conversion of wireless apparatus from d.c. to a.c.—Harmer & Simmons.

HACKNEY.—Baths Committee. Recommended. Electric lighting and power installation at the Gainsborough Road baths and wash-house (£660).—W. Steward & Co.

STEPNEY.—Electricity Supply Committee. Recommended. Provision of duplicate busbars at the Limehouse generating station (£11,900).—Ferguson, Pailin, Ltd.

HAMMERSMITH.—Electricity Committee. Recommended. One electric vehicle (£225).—Partridge, Wilson & Co., Ltd.

METROPOLITAN WATER BOARD. Recommended. Steam turbine with centrifugal pumps and electric generator for Hammersmith waterworks (£11,764).—Worthington-Simpson, Ltd. This was the lowest of thirty-five tenders, the highest being £13,192.

Middlesex.—Health Committee. Accepted. Electrical installation at Willesden health offices (£442).—T. Clarke & Co., Ltd. Recommended. Electric cooking apparatus at Clare Hall sanatorium (£315).—Jackson Electric Stove Co., Ltd. Installation of the apparatus (£132).—Rashleigh Phipps & Co., Ltd.

South Africa.—CAPE TOWN.—Electricity Committee. Recommended. Switchboard (£1,542).—A. Reyrolle & Co., Ltd. Rectifier plant (£2,960).—H. Davies & Co., Ltd. Three voltage regulators (£331).—English Electric Co., Ltd.

Southend-on-Sea.—Town Council. Accepted. Electric heating apparatus for extension at the municipal buildings (£501).—W. Jay. Transformer kiosks for a period of two years.—General Electric Co., Ltd.

Stoke-on-Trent.—Cleansing Committee. Accepted. Battery for electric vehicle (£110).—D. P. Battery Co., Ltd.

Weymouth.—Town Council. Accepted. Carrying out the change-over in the Rodwell area (£1,079).—V. H. Bennett & Co.

Wick.—Education Committee. Accepted. Wiring, &c., at the new elementary school (£331).—John-o-Groats Electrical Engineering Co., Ltd.

Wrexham.—Town Council. Accepted. Electric lighting at the new abattoir (£225).—S. Thornton.

Forthcoming Events

Institute of Fuel.—Friday, March 1st. British Industries House Club, W.1. 6.30 for 7 p.m. Debate on "Is the Expenditure on the Electrical Grid Likely to be Justified?" To be opened by Mr. H. Hobson.

Association of Mining Electrical Engineers.—Saturday, March 2nd. Joint visit with the Kent Sub-Branch to a mine in Kent to illustrate "Wireless Signalling Experiments" by Mr. C. H. Roddis. (*West Wales Branch*).—Saturday, March 2nd. Y.M.C.A., Swansea. Discussion on H.M. Electrical Inspector of Mines' Report for 1933. To be opened by Mr. J. A. B. Horsley.

Electrical Power Engineers' Association (*London Local Group*).—Saturday, March 2nd. Napoleon Restaurant, W.1. 7 p.m. Annual dinner and dance.

Institution of Electrical Engineers.—Monday, March 4th. Institution, London. 7 p.m. Informal meeting. Discussion on "Small Rectifiers." To be opened by Messrs. G. F. Bedford, S. A. Stevens and H. Rissik. (*Meter and Instrument Section*).—Friday, March 1st. Institution, London. 7 p.m. "Small Self-Starting Synchronous Time Motors." Messrs. W. Holmes and E. Grundy. (*Mersey and North Wales (Liverpool) Students' Section*).—Tuesday, March 5th. The University, Liverpool. 7.30 p.m. "Grid Controlled Mercury Arc Rectifiers." Mr. L. B. Wood. (*North Midland Centre*).—Tuesday, March 5th. Hotel Metropole, Leeds. 7 p.m. Informal discussion on the Wiring Rules. Friday, March 8th. Hotel Metropole, Leeds. 7 for 7.30 p.m. Annual dinner. (*North-Western Centre*).—Tuesday, March 5th. Engineers' Club, Manchester. 7.15 p.m. Joint meeting with the Institution of Post Office Electrical Engineers. "The Engineer Administrator." Mr. E. S. Byng. (*Scottish Students' Section*).—Tuesday, March 5th. Heriot Watt College, Edinburgh. 7.15 p.m. Details to be announced later. (*North-Eastern Centre*).—Wednesday, March 6th. Literary and Philosophical Society, Newcastle-upon-Tyne. Faraday Lecture. "Electricity in the Life of To-day." Prof. E. W. Marchant. (*Wireless Section*).—Wednesday, March 6th. Institution, London. 6 p.m. "Crystal Oscillators for Radio Transmitters." Messrs. C. F. Booth and E. J. C. Dixon. (*London Students' Section*).—Friday, March 8th. Institution, London. 7 p.m. "High-Voltage Alternators." Mr. P. E. Crawshaw Smith. Visit to the "Daily Herald" printing offices. 10 p.m. (*North-Eastern Students' Section*).—Friday, March 8th. County Hotel, Newcastle-upon-Tyne. 7.30 p.m. Annual dinner.

Institute of the Plastics Industry.—Tuesday, March 5th. Federation of British Industries, S.W.1. 7.30 p.m. Joint meeting with the Plastics Group of the Society of Chemistry and Industry. Paper by Mr. H. V. Potter and a sound film, "Bakelite—The Material of Infinite Uses."

Institution of Heating and Ventilating Engineers.—Wednesday, March 6th. London School of Hygiene and Tropical Medicine, W.C.1. 7 p.m. "Noises Generated by Fan Operation." Mr. D. S. Woodley.

Electrical Wholesalers' Federation.—Thursday, March 7th. Savoy Hotel, W.C.2. Annual dinner.

Birmingham Electric Club.—Friday, March 8th. Grand Hotel, Birmingham. 7 p.m. Annual dinner.

Institute of Metals (*Sheffield Local Section*).—Friday, March 8th. The University, Sheffield. 7.30 p.m. "Electric Annealing and Heat Treatment Furnaces." Mr. A. G. Lobley.

Royal Institution.—Saturday, March 9th. Institution, London. 3 p.m. "Electromagnetic Radiation." Lord Rutherford.

Notes

Benevolent Fund Ball

The fifth annual ball under the auspices of the Tees-Side section of the E.I.B.A., was held at the Town Hall, Middlesbrough, on February 22nd. Five hundred guests were present. The previous dances have resulted in over £250 being paid to charity, and it is anticipated that as a result of this function, a further handsome cheque will be forwarded. Ald. S. A. Sadler is president of the branch and Mr. R. N. Crawford, of British Insulated Cables, Ltd., succeeded the late Mr. R. N. Scotson as chairman. The secretarial work was carried out by Messrs. G. W. Middleton and J. W. Lees. The hon. treasurer was Mr. A. T. Griffith of the General Electric Co., Ltd., Middlesbrough, and Mr. A. Parkin, E.D.A. Area Officer, was principal M.C.

Electrical Power Engineers' Dinner

The Devon and Cornwall Section of the Electrical Power Engineers' Association held its annual dinner and dance on February 23rd at Newton Abbot, when Mr. R. Ferguson, the chairman, presided over about fifty members and guests. The toast of the Association was proposed by Mr. G. J. Hollyer (borough electrical engineer, Torquay), who, referring to his early connection with the E.P.E.A., expressed dissatisfaction with the schedule of salaries. He thought salaries should be stabilised.

Mr. C. Cooper (president, E.P.E.A.) responded. After expressing satisfaction with the revised grid scheme for the South-West and with the part Devon and Cornwall were now playing in it, he supported Mr. Hollyer's complaints regarding the schedule. The toast of the electrical industry was put by Mr. H. F. G. Woods (manager of the Exe Valley & East Devon Power Co.), and Mr. G. W. Essex (assistant general secretary, E.P.E.A.) responded. The chairman proposed the health of the guests, for whom Mr. H. Midgley (borough electrical engineer, Plymouth) replied.

The annual dinner and dance of the Kent Section of the Electrical Power Engineers' Association will be held on March 16th at the Co-operative Hall, Gravesend. Tickets can be obtained from Mr. F. E. Allen, hon. secretary of the Section, Chagford, Darnley Road, Gravesend.

I.E.E. (North-Midland Centre)

The annual dinner of the North Midland Centre of the Institution of Electrical Engineers will be held at the Hotel Metropole, Leeds, on March 8th.

The N.E.S.C.O.E. Association

A good programme has been arranged in connection with the fourth annual dinner (tickets 7s. 6d. each) of the North-East Coast Electric Supply Companies' Old Employés, which is to be held at the Royal Station Hotel, Newcastle-on-Tyne, on Tuesday, March 19th. Mr. R. P. Sloan (president) will be in the chair, and Mr. H. A. Couves (director and general manager of the company) will be the guest of honour. As the dinner is open to members of the present staff, the reunion should be more enjoyable than ever. Visits have been arranged to the works of Messrs. Reyrolle & Co., Ltd., at Hebburn in the morning of the same day, and to Dunston power station in the afternoon, after which an opportunity will be afforded of seeing the showrooms, lighting department and control room at Carliol House. Further particulars are obtainable from the hon. secretary, Mr. W. G. Bass, 506, Bush House, Strand, W.C.2.

Television Relays

Addressing local members of the Post Office Engineering Department at their annual dinner at Newcastle last week, Sir Stephen Tallents, public relations officer to the G.P.O., declared that within six years all the telephones in the country would be automatic. Owing to developments now taking place it was confidently expected that in the future it would be possible to send no fewer than 200 telephone messages over one line simultaneously. Such a capacity would be necessary because of the anticipated television developments and might be possible through the wide range of frequencies used in the transmission of messages. Mr. B. O. Anson said that Post Office engineers were preparing for the future and hoped to produce a cable by which television programmes could be relayed from London to the provinces, or between studios, just as the ordinary broadcasting programmes were relayed.

Appointments Vacant

Lady demonstrator for Chesterfield Electricity Department.

Temporary fitter-turner and temporary works and boiler-house foreman for Hornsey Electricity Department.

Sales engineer for Swansea Electricity Department.

Plumber-jointer electrician for Plympton St. Mary Electricity Department.

Lady demonstrator for St. Pancras Electricity Department.

(See our classified advertisements.)

Makers' Names Wanted

C.M.C. lighting fittings.

VICTORY lamp.

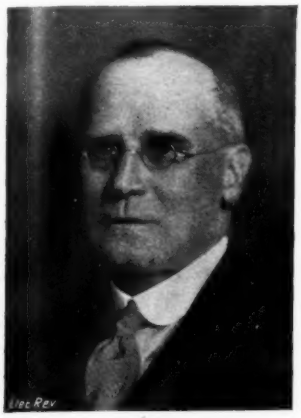
SCINTILLA signal horn handlamp with both front and top lenses.

Our Personal Column

Electrical men are invited to keep readers of the "Electrical Review" posted concerning their movements

A number of well-known "Cromptonians" are organising a banquet for Friday, May 31st, to celebrate the ninetieth birthday of **Col. R. E. B. Crompton,** C.B., which falls on that day. Sir Arthur Stanley, G.B.E., C.B., M.V.O., will take the chair. The provisional committee includes Mr. S. L. Brunton, Lt.-Col. K. Edgcumbe, Mr. E. J. Fox, Mr. J. W. Meares, Mr. A. H. Pott, Sir John Snell and Sir James Swinburne, Bt. Mr. Fox is acting as honorary secretary and treasurer, and will welcome communications at the Manor House, Stanton-by-Dale, near Nottingham. At the subscription banquet a portrait of himself will be presented to Col. Crompton, who desires to hand it to the Institution of Electrical Engineers. Subscriptions, limited to one guinea, should be forwarded to Mr. Fox not later than March 31st.

Mr. H. C. Siddeley, M.I.E.E., who has now completed his three-years' term as the delegate of the B.E.A.M.A., in Argentina, and has been in this country for several months, is shortly returning to Argentina to carry on his activities there as the representative of a group of British manufacturers. An article setting forth his views on the electrical situation out there appears on page 303 of this issue of the ELECTRICAL REVIEW.



Mr. H. C. Siddeley

Mr. H. Haigh, electrical engineer and manager of the Shipley Urban District Council's Electricity Department, has been recommended by the Middlesbrough Gas and Electricity Committee for the appointment of borough electrical engineer at Middlesbrough, in succession to the late Mr. R. H. Scotson, at a salary of £750, rising to £1,000.

Mr. E. C. Lock, of the Anchor Cable Co., Ltd., won the 1,000-yd. foot race at a sports meeting in Mortlake, Surrey, in 1892, and was presented by the Duke of Teck with an opal tie-pin. Some time ago he lost the pin, and he has now received from the Queen, through her private secretary, a gold pin having Her Majesty's crown and cypher on it, to replace the one which was lost.

Mr. R. O. Kapp, B.Sc., M.I.E.E., has been appointed by the Senate of London University to the Pender Chair of Electrical Engineering tenable at University College. Mr. Kapp, the son of the late Dr. Gisbert Kapp, was educated in Germany, and studied electrical engineering at the University of Birmingham, where he took the B.Sc. degree in engineering in 1909. In the same year he joined Messrs. Brown Boveri & Co., Switzerland, in the Traction Department, where he was engaged in the design and construction of electric locomotives and the design of electric traction schemes. He left the company in 1913 to join Messrs. Kennedy & Donkin, consulting engineers, and was associated with the electrification of the London & South Western Railway. He has been responsible for electrical installations in England and overseas, and particularly for all designs and specifications of the power station, sub-stations and transmission system of the Calcutta Electric Supply Corporation. He has been intimately asosciated with the national electricity scheme, and assisted Mr. J. M. Kennedy in the preparation of his report to the Minister of Transport of June, 1926, and also acted as his chief assistant in the preparation of the regional schemes for submission to the Electricity Commission. He has been in charge of design and contract work for the construction of the N.W. England and North Wales scheme. He has read many technical papers before various Institutions.

[Elliott & Fry.

Mr. R. O. Kapp

Mr. J. C. Cottrell, of the staff of the Wellington (Somerset) & District Electricity Co., who was recently married to Miss W. R. Barter, has been presented with an oak dinner wagon.

Mr. W. T. Clough, principal and head of the Engineering Department of the Technical College, East Ham, is retiring after thirty years' service, owing to ill-health.

Mr. J. A. Sumner, the author of the paper on "Private Plants and Public Supply Tariffs," which was read before the Institution of Electrical Engineers in London yesterday (Thursday), served his apprenticeship in mechanical engineering at Beck Works, Nottingham, and after serving in the Royal Air Force during the war he studied at the University College, Nottingham, from 1919 to 1922, and during the latter year joined the Derbyshire & Nottinghamshire Electric Power Co. In 1925 he was appointed chief assistant engineer with the Mid-Cheshire Electric Supply Co., Northwich, and since 1930 he has held the position of distribution engineer with the West Midlands J.E.A., which he joined to commence its scheme of distribution.

[Elliott & Fry.

Mr. J. A. Sumner

A complimentary dinner to **Mr. E. Morgan,** until recently manager of the Sheffield Corporation Electricity Department, was given in Sheffield, on Monday last, by many prominent business men and civic dignitaries. Mr. Morgan is now managing director of the Shropshire, Worcestershire, and Staffordshire Electric Power Co. In reply to a toast in his honour, Mr. Morgan said that as the result of recent developments in the Sheffield undertaking the city would be generating enough electricity not only for local needs but also for "export." Coun. J. Longden, chairman of the Electricity Committee, Sir Ronald Matthews, Coun. W. J. Hunter, and Sir Holberry Mensforth, chairman of Edmundson's Electricity Corporation, Ltd., also spoke.

Mr. T. C. Gilbert, A.M.I.E.E., has been nominated by the Council of the Electrical Contractors' Association to succeed Mr. H. Marryat, M.I.E.E., as examiner in electrical installation work to the City and Guilds of London Institute. Mr. Marryat, now president of the E.C.A., is retiring from this position, which he has held for the past nine years.

Mr. G. C. Balchin has completed fifty years' service in the Accounting Department of the Edison Swan Electric Co., Ltd., and on Saturday last a function was held, at which he received a gold watch from the company and two easy chairs and a coffee set from his colleagues. The presentation from the company was made by Mr. F. V. Hasemore (director),

Mr. G. C. Balchin receiving a presentation to commemorate his completion of fifty years' service with the Ediswan Co.

and that from his colleagues by Mr. J. H. W. Morgan (chief accountant), who was supported by twelve members of the staff whose combined service totalled 510 years. Mr. Balchin recalled the days when Sir (then Mr.) Joseph Swan, in conjunction with Thomas Edison, was developing the electric lamp, and he remembered the time when, as the company's consultant, Sir Ambrose Fleming made those discoveries which have led to the modern radio valve.

Mr. L. C. Meyer, of Callender's Cable & Construction Co., Ltd., has resigned after thirty-six years' service, and has been presented by his colleagues with a gold wristlet watch. Mr. Meyer is joining his son, Mr. L. H. P. Meyer, managing director of New Homesteads, Ltd.

Mr. A. E. Knights, electrical engineer to the Bury St. Edmund's Town Council, has had his salary increased from £500 to £600 per annum.

Mr. A. F. Walker, an electrical engineer on the staff of Standard Telephones & Cables, Ltd., was married recently to Miss Marian Moore.

Mr. J. B. Glen, deputy electrical engineer to the Tynemouth Corporation, has been recommended for the appointment of borough electrical engineer, to succeed Mr. C. Turnbull, who is retiring from that position in June next.

Mr. C. Townsend was elected chairman of the South-West England and South Wales (Northern) Area of E.D.A. for the ensuing year at the annual meeting of the Area Executive Committee held on February 20th, and **Mr. A. Nichols Moore** was elected vice-president.

Obituary

Mr. A. W. Tilbury.—The death is announced, at the age of thirty-four years, of Mr. Albert William Tilbury, the Buckingham district engineer to the Northampton Electric Light & Power Co., Ltd. He was trained at Faraday House, and was for three years on the staff of the Aylesbury Corporation Electricity Department, joining the Northampton Co. in 1929.

Mr. E. W. Johnson.—The death is announced, at the age of seventy-two, of Mr. Edward William Johnson, of Sydenham, who was, until his retirement about a year ago, chief electrician at the Crystal Palace.

Mr. W. M. Bowering.—The death occurred on Friday last, at the age of forty-eight, of Mr. William Matthew Bowering, of Aylesford, who for the past thirteen years had been the chief electrical engineer at Messrs. Reed's Paper Mills.

Sir H. Lincoln Tangye, Bt.—The death is announced, in a London nursing home, of Sir H. Lincoln Tangye, at the age of sixty-nine. He was the son of the late Sir Richard Tangye, and deputy chairman of Tangyes, Ltd.

Financial Section

New Companies, Returns of Share Capital, Debenture Charges, Reports of Electrical Companies, Dividend Changes, Transactions in Stocks and Shares

New Companies Registered

Coiled Coil Lamps, Ltd.—Private company. Registered February 20th. Nominal capital, £100 in £1 shares. Objects: To carry on the business of manufacturers and suppliers of incandescent and electric lamps and other apparatus connected with the illuminating or heating power of gas, electricity, spirit, oil, &c. The subscribers are: J. Ismay, Roden Street Works, Ilford, Essex, and T. S. Cornwall, "Braemore Lodge," Bromley, Kent. J. Ismay signs as director.

A.E.W., Ltd.—Private company. Registered February 18th Capital, £100 in £1 shares. Objects: To carry on the business of electrical and mechanical engineers and contractors, &c. The permanent directors are: A. E. Watkins (chairman) and Mrs. Lily Watkins, both of 244, Dollis Hill Lane, N.W.2. Registered office: Imperial Works, High Road, Edgware, Middlesex.

Viso, Ltd.—Private company. Registered February 16th. Capital, £100 in £1 shares. Objects: To carry on the business of manufacturers and suppliers of, and wholesale and retail dealers in, all kinds of mechanical, electrical, wireless, television, and sound apparatus, &c. The permanent directors are: L. Runalls, 52, Waverley Road, Southsea, and two others.

L. G. Attree & Co., Ltd.—Private company. Registered February 19th. Capital, £6,000 in £1 shares. Objects: To acquire the business of an electrical, contracting and installation engineer, battery service depôt and battery and wireless factor carried on by L. G. Attree at 85-7 and 95, South Street, Bishops Stortford, as "L. G. Attree & Co." The directors are: J. Mitchell, The Croft, Bourn, Cambs, and two others. Secretary: J. H. G. Mitchell. Registered office: 87a, South Street, Bishops Stortford, Herts.

Piezo Electric Sound, Ltd.—Private company. Registered February 20th. Capital, £100 in £1 shares. Objects: To carry on the business of inventors, manufacturers and hirers of, and dealers in, apparatus for the recording and reproduction, transmission and amplification of sound, engineers, electricians, and dealers in, and producers of, cinematograph films, wireless, electrical and acoustical apparatus, &c. The subscribers are: G. R. Mehew, 25, Sudeley Street, Islington, N.1, and M. A. Tarlo, 119/120, London Wall, E.C.2. Solicitors: Tarlo & Co., 119/120, London Wall, E.C.2.

Isle of Wight Auto & Electrical Services, Ltd.—Private company. Registered February 20th. Capital, £2,500 in £1 shares (500 6 per cent. cumulative preference and 2,000 ordinary). Objects: To adopt an agreement for the acquisition of the business of an electrical engineer, car lighting and ignition repair and service depôt, &c., carried on by Harry A. Wills as "Auto and Electrical Services," at 80, Pyle Street, Newport, I.W. The first directors are: H. A. Wills (permanent managing director), "Headley," Fairlee Road, Newport, I.W., and two others. Solicitors: Gunner, Wilson & Jerome, Newport, I.W.

Roberts (South Shields), Ltd.—Private company. Registered February 21st. Capital, £4,300 in £1 shares. Objects: To acquire the business of Roberts' Wireless and Television carried on by G. N. Roberts and J. E. Thompson, at 130, Fowler Street, South Shields. The first directors are: J. E. Thompson, 40, Harton Rise, South Shields, and three others. Registered office: Keppel Chambers, Keppel Street, South Shields.

Beacham, Hastelow & Co., Ltd.—Private company. Registered February 23rd. Capital, £500 in 10s. shares. Objects: To carry on the business of manufacturers of and dealers in electrical appliances, plant, machinery and fittings and accessories, gramophones, wireless and television apparatus, &c. The subscribers are: G. M. B. Grice, 89, Pershore Road, Edgbaston, Birmingham, and Marjorie F. Hastelow, 41, Ettington Road, Aston, Birmingham. Geo. M. B. Grice is permanent director. Secretary: Harry T. Lucas.

J. Isow, Ltd.—Private company. Registered February 4th. Capital, £500 in £1 shares. Objects: To carry on the business of electrical and mechanical engineers, manufacturers and importers and exporters of electrical machinery, &c. The first directors are: I. I. Isowitsky, 13, Clapton Common, E.5; and L. G. Cook, School House, Bath Street, E.C.1. Registered office: 157b, Stoke Newington Road, N.16.

Returns of Electrical Companies

Electric Reduction Co., Ltd.—Capital, £50,000 in 16,200 preference and 33,800 ordinary shares of £1. Return dated November 6th, 1934. 16,200 preference and 28,800 ordinary shares taken up. £18,000 paid on 13,000 preference and 5,000 ordinary shares, £27,000 considered as paid on the remainder. Mortgages and charges: £25,000.

Credenda Conduits Co., Ltd.—Capital, £50,500 in £1 shares. Return dated November 6th, 1934. All shares taken up. £30,500 paid, £20,000 considered as paid. Mortgages and charges nil.

Sir W. G. Armstrong Whitworth & Co. (Engineers), Ltd.—Debenture charged on the company's undertaking and property, present and future, including uncalled capital, dated February 11th, 1935, to secure all moneys due or to become due from the company to Martins Bank, Ltd.

Charles H. Champion & Co., Ltd.—Satisfaction in full on September 18th, 1934, of debenture dated October 27th, 1932, and registered November 17th, 1932, securing £20,000. (Notice filed February 15th, 1935.)

Neon Manufacturers, Ltd.—Mortgage debenture, dated February 15th, 1935, to secure £2,300, charged on benefit of certain contracts, and of an agreement, dated September 30th, 1933, and the company's undertaking and other property, present and future, including uncalled capital. Holders: Tudor Investment Trust, Ltd., 84, Temple Chambers, Temple Avenue, E.C.4.

Solidite & Synthetic Mouldings, Ltd.—Sydney E. Smith, O.B.E., of 4, Broad Street Place, E.C.2, was appointed receiver on February 11th, 1935, under powers contained in debentures dated August 16th, 1927, and March 13th, 1928.

Dacier, Ltd.—Satisfaction on February 11th, 1935, of Land Registration Charge dated May 7th, 1926, and registered May 10th, 1926. (According to the register of mortgages, the charge registered May 10th, 1926, originally secured all moneys due to bank.) Land Registration Charge on 8, 10 & 12, Wagner Street, Old Kent Road, S.E., dated February 11th, 1935, to secure all moneys due or to become due from the company to Barclays Bank, Ltd.

Inventum Electrical Appliances, Ltd.—Capital, £500 in £1 shares. Return dated December 14th, 1934. Fifty-two shares taken up. £52 paid. Mortgages and charges nil.

City Notes

The Electrical Distribution of Yorkshire, Ltd., reports a profit for 1934 of £186,765, as compared with £161,182 in the preceding year, to which is added £30,123, making £216,888. It is proposed to pay a final ordinary dividend of 4½ per cent., maintaining the distribution for the year at 9 per cent., to place £50,000 to depreciation and reserve, and to carry forward £36,807. The sales of electricity during the year amounted to 36,971,733 kWh, as compared with 32,087,314 kWh in 1933, and the number of consumers was 72,668, against 63,773. A large proportion of the increased demand for electricity was from new houses erected in all parts of the company's area. The use of electricity for domestic purposes is being encouraged by suitable tariffs and facilities for the purchase of apparatus by deferred payments. Further contracts have been made with local authorities for street lighting, including many extensions of existing schemes. A large capital expenditure has been made during the year on sub-stations, mains and services to meet the increased demands. The Penrith Electric Supply Co. has obtained the approval of Parliament to defer the first optional date of purchase of the undertaking by the local authority from 1950 to 1981, and the Mid-Cumberland Electricity Co., Ltd., has carried out many extensions whilst others are in progress. In the Penrith and Mid-Cumberland areas the number of consumers increased from 1,817 in 1933 to 3,499 in 1934. The issue of £300,000 of 6 per cent. cumulative preference shares made in March, 1934, was fully applied for. After the ordinary business of the annual meeting, to be held in Leeds on March 5th, a resolution will be submitted for converting these shares

into 6 per cent. cumulative preference stock. The new stock will rank for all purposes with the £400,000 of 6 per cent. cumulative preference stock already converted and will be transferable in one or more units of £1. With the report the company has issued a folder illustrating some of the uses of electricity in rural areas.

The Charing Cross Electricity Supply Co., Ltd., reports that the gross earnings of the West End undertakings for 1934 were £379,211, and the net earnings £116,663. The ordinary dividend is maintained at the standard rate of 7 per cent., the shareholders' proportion of "consumers' benefit," amounting to £5,606, is transferred to reserve, £6,958 is appropriated to co-partners. The amount carried forward is £91,438. The gross earnings of the City undertaking totalled £374,770, and expenses were £247,264. The balance brought in is £30,436, and rent in respect of Bow generating station and trunk mains, &c., £60,927, making £218,869 available. After providing for debenture interest, &c., it is proposed to place £15,521 to reserve No. 2, £8,424 to shareholders' proportion of "consumers' benefit," £4,428 to co-partners, and to carry forward £11,333. The company now has connected to its West End mains a total of 52,395 kW, and to its City mains 56,144 kW. The directors recommend that the ordinary and preference shares of both undertakings should be converted into ordinary and preference stock. Meeting: March 6th.

The Westminster Electric Supply Corporation, Ltd., reports a net profit for 1934 of £141,523, as compared with £140,232 for 1933. To this is added £40,144 brought in, making £181,667. It is proposed to pay a final dividend on the ordinary stock of 4½ per cent., making the standard dividend of 7 per cent. for the year, to transfer to No. 2 reserve the ordinary members' proportion of the consumers' benefit for the years 1932, 1933, and 1934, and to carry forward £43,592. The standard prices to operate from January 1st, 1932, were approved during the year by the Electricity Commissioners. The total number of meters connected to the company's mains at December 31st last was 46,597, as compared with 43,590 in the preceding year, and the sales of electricity totalled 99,158,138 kWh, as against 89,197,446 kWh, an increase of 11.2 per cent. Mr. J. A. Gatti has been appointed to the board. Meeting: March 5th.

The St. James' & Pall Mall Electric Light Co., Ltd., reports a net profit for 1934 of £57,568, as compared with £79,309 in the preceding year, which with £70,941 brought in, makes £128,510 available. Reserve fund No. 2 receives £6,077, and co-partners £5,605. The ordinary dividend for the year is 7 per cent. (against 7½ per cent.), plus a special bonus of 1¼ per cent. A sum of £55,893 is caried forward. The connections increased during the year from 48,428 to 52,300 kW, and the sales of electricity from 45,682,23 to 48,324,608 kWh. The report states that discussions have taken place between the comany and certain other London electricity supply companies with the object of arriving at an arrangement for co-ordinating their respective distribution resources, and communications dealing with this matter will be sent to members as soon as possible. Meeting: March 5th.

The Midland Counties Electric Supply Co. reports that the trading profits of the undertakings owned and operated by the company amounted to £550,228 during 1934, as compared with £466,347 in 1933. The sum of £211,544 (against £135,000) has been appropriated to depreciation and reserves by these undertakings. The net revenue of the parent company was £323,899, as compared with £308,027 in the preceding year, to which is added £6,610 brought in, making £330,509 available. After providing for debenture interest, &c., placing £10,455 to investment reserve and £27,000 to general reserve, the ordinary dividend for the year is maintained at 7 per cent., and £6,304 is carried forward. The generating stations owned by the power companies have been operated since April 1st last as selected stations. Meeting: March 4th.

Mather & Platt, Ltd.—Presiding at the annual meeting on February 22nd, Mr. L. E. Mather (chairman), said the results of the year under review were gratifying and showed that they had benefited by the general improvement in trade. In electrical and pumping work they had benefited by the general expansion in municipal and industrial requirements. They had supplied the motors and a number of pumps for plant which Imperial Chemical Industries, Ltd., had erected at Billingham and had received a share of the orders for similar equipment for the new steel works at Corby of Messrs. Stewarts & Lloyds. The increased activity in the building trade had had a good effect on the demand for sprinkler installations and other fire engineering products. The use of their Grinnell sprinkler system for the protection of ships had been extended, and among orders received was one for the complete equipment of the *Queen Mary*. Their patent "Mulsifyre" system was also making headway.

Crossley Bros., Ltd., have issued details of a scheme for the reconstruction of the capital which will be submitted to shareholders at meetings to be held on March 19th. It has become necessary to write down assets by approximately £250,000, by reducing the ordinary shares from 10s. to 5s. per share, the reserves being retained to cover possible further loss on realisation of investments, &c. The ordinary shares will in future be known as deferred ordinary shares, and in addition ordinary shareholders are to surrender one out of every four of their shares to the company to be reissued to the preference shareholders who will thus become the owners of 25 per cent. of the equity. In return the preference shareholders are asked to sanction the modification of their rights.

Broadcast Relay Service, Ltd.—In order to strengthen the capital structure and to remove the handicap at present caused by the existence of a floating charge on its assets, the directors, according to *The Times*, are seeking power to redeem immediately the outstanding 7 per cent. debentures at 112 per cent., interest accrued since November 15 last being cancelled. The company also proposes to offer the 666,800 unissued 1s. shares to debenture and shareholders for subscription at 5s. 4½d. each. Debenture holders are offered 400 shares of the company and a cash payment of £4 10s. in exchange for each £100 debenture.

The Kensington & Knightsbridge Electric Lighting Co., Ltd., in its report for 1934 shows a net profit of £33,714, as compared with £46,928 for the preceding year. A further contribution of £5,000 is made towards the cost of replacing apparatus on changing over from d.c. to a.c., £2,531 is placed to reserve fund No. 2, and the standard ordinary dividend of 7 per cent. is maintained, leaving £10,091 to be carried forward. The sales of electricity amounted to 32,344,910 kWh, an increase of 8.72 per cent. Meeting: March 7th.

S. Smith & Sons (Motor Accessories), Ltd.—According to the *Financial Times* the company has placed through Messrs. Helbert Wagg & Co., Ltd., the unissued balance of 50,000 £1 7 per cent. non-cumulative preferred ordinary and 280,000 1s. deferred ordinary shares. The new capital is required for extension of buildings and plant necessary to meet expansion of the business.

Clarke, Chapman & Co. report a profit for 1934 of £40,491, as compared with a loss of £43,364 in the preceding year, to which is added £721 brought in, making £41,212. After providing for depreciation, &c., it is proposed to pay an ordinary dividend of 5 per cent. (against nil), and to carry forward £9,178. Meeting: March 1st.

The Telephone & General Trust, Ltd., is paying a final ordinary dividend of 5 per cent., making 8 per cent. for the year (unchanged). A dividend of 8 per cent. on the "A" ordinary shares is also announced.

The Yorkshire (West Riding) Electric Tramways, Ltd., has announced an ordinary dividend of 6½ per cent. for 1934 (against 5 per cent.).

The National Gas & Oil Engine Co., Ltd., again proposes not to pay an ordinary dividend for 1934, but recommends a dividend of 5 per cent. on the preference shares (against nil).

The Brompton & Kensington Electricity Supply Co., Ltd., has announced a final dividend of 8.4d. per share, less tax, making the standard dividend of 7 per cent. for the year.

The North-Eastern Electric Supply Co., Ltd., has declared a final ordinary dividend of 3½ per cent., maintaining the distribution for the year at 6 per cent.

The Clyde Valley Electrical Power Co. has declared a final ordinary dividend of 5 per cent., making 8 per cent. for the year (against 7 per cent.).

The Norwich Electric Tramways Co. is paying an interim dividend of 2 per cent.

The Pennsylvania Water & Power Co. is paying a quarterly dividend of 75 cents on the common shares (same).

The Western Electricity Supply Co., Ltd., has declared an interim ordinary dividend of 4 per cent. (same).

Stocks and Shares

Tuesday Evening.

THE Stock Exchange finds that a definite halt has been called in the demand for what may be termed the safety-first securities. From the peak prices recently attained, considerable declines have occurred in the markets for gilt-edged securities of all kinds. Enquiry is rife as to whether this setback in prices is likely to prove permanent—whether, that is to say, it can be accepted as marking the end of the recent period of low-yield rates, or whether the present depression is going to prove no more than a temporary hiatus, to be succeeded by a fresh absorption of investment stocks and shares, and a consequent recovery in quotations. Who can best answer the question must be left for the future to determine. Under present conditions the slackening of demand is very noticeable. It is accompanied by a general fall, of which such first-rate investment shares as those of the electricity supply ordinary group furnish typical examples. For the third week in succession prices have given way, and already, by comparison with the range of prices at the end of last year, to-day's level is noticeably lower.

Public Boards' Stocks

Fixed-interest stocks in this section have moved but little. There has been, it is true, no rally from the falls that overtook London Passenger Transport stocks a week ago, but, on the other hand, no further decline has occurred. The "C" stock remains at 93 ex dividend. Central Electricity issues have hardly been affected up to the present by the dullness evident in the market for similar securities. The Tata Power 2 per cents., which came out at 98 and were promptly oversubscribed, stand at ¾ premium, clear evidence of the investor's intention to put safety of capital before all other considerations. At the present price the yield on the money is about 2 guineas per cent. The issue is dated 1944-1948, and the market estimate of the average life is 7½ years. A first interest payment of £1 per cent. will fall due on November 15th next. London and Home Counties 4½ per cent. stock is a point better, at 114.

There is £1,500 London Passenger Transport 4½ per cent. stock, 1942-1972, on offer at 113, January and July interest. This yields a trifle under 4 per cent. on the money outright, and £2 8s. per cent. allowing for redemption at the earlier of the two dates.

Electricity Supply Shares

Prices of shares in the home electricity companies show losses in all the sections, London, Provincial, and Scottish alike. Yorkshire Electrics are 3s. down at 44s. 6d., after touching 43s. Northamptons are down 2s. 6d., Bournemouths 2s. The other declines are rather less. It is not surprising to find that many people are asking for some satisfactory explanation of this shrinkage in values. The first cause is undoubtedly the pause that has occurred in the demand for

investment stocks and shares. The second may be connected with a measure of disappointment felt with the policy of those boards that have issued pre-ordinary stocks and shares instead of offering to the proprietors new issues of shares at bonus prices. The companies' policy is easily defended from the point of view of sound finance. The more cheaply a company can raise capital, the better it will be, ultimately, for holders of ordinary shares. For the time being, however, the man who has bought ordinary shares with the expectation of receiving offers of new shares at attractive prices feels disappointed when new capital is raised on terms that do not offer much chance of a bonus on the issue price. Other causes can be advanced to account for the decline in electricity supply values, but these are of minor consequence.

Dividends and Share-prices

The various reports which are appearing in respect of 1934 results give little reason for criticism. Most of them show that the companies are making consistent progress. The St. James' & Pall Mall Company, in spite of a decline of nearly £20,000 in the net profits, is increasing its dividend to 8¼ per cent., the additional 1¼ per cent. above the standard dividend being paid out of No. 2 reserve. The Midland Counties Electric Supply Company repeats its previously paid 7 per cent. dividend, and publishes excellent figures. The Electrical Distribution of Yorkshire Company has increased its sales by leaps and bounds. The dividend is maintained at 9 per cent., and the profits for the year are £25,600 up. Nevertheless, the price of the shares this week has fallen 1s. 6d. to 47s. 6d. West Gloucestershire ordinary is a couple of points down at 93. Llanellys eased off to 25s. 6d., Hendons shed a florin to 53s. The Clyde Valley Electric Power Company is paying 8 per cent. for the year, against 7 per cent. This raises the present yield to £3 16s. 2d. per cent. Scottish Power ordinary at 41s. 3d. are $\frac{1}{16}$ down.

Palestine Electric

Very considerable over-subscription was secured by the 4½ per cent. preference offered last week in the Palestine Electric Supply Company. A rush for the shares resulted in the lists being closed very early, and for once in a way it was presumed that the stags would not withdraw their applications. The ordinary shares were offered to existing proprietors of ordinary shares, at 25s. per share. Dealings started in the market on the basis of 32s. In the course of a few days the price had risen to 36s. 6d. The preference shares are redeemable at 20s. 6d. by the operation of a cumulative sinking fund calculated to redeem the issue by the end of 1963. The present 4 per cent. debentures and 6 per cent. second debentures are to be repaid out of the proceeds of the new issue of shares.

Cable and Wireless

Prices in the Cable & Wireless trio are lower, more in sympathy with dullness in other parts of the Stock Exchange than in consequence of any noticeable volume of selling. The preference stock has receded to 83. This brought about a decline to 11¼ in Globe Telegraph ordinary. The American prices keep tolerably firm. American Telephone & Telegraph at 107 shows a point gain. International Telephone & Telegraph shares are quoted at 8½. Great Northerns remain very steady at 39½.

Manufacturing and Equipment

The general tendency in the market for shares in the manufacturing and equipment group has been a little easier. British Insulated gave way to 77s. 6d., Callenders came on offer at 70s. Enfields are 5s. weaker at 4¾: a line of 500 shares became available at that price. Enfield Rolling Mills held their price at 27s. Ericsson Telephones are unchanged at 5 17/16. International Automatic Telephone ordinary and deferred are 39s. 6d. and 37s. respectively. Telephone Rentals are a trifle easier at 8s. 10½d. Another sharp recovery in Ever-Ready shares lifted the price to 23s., which shows a florin advance on the week. What brought about the improvement it was difficult to ascertain. Half-a-dozen buyers seemed to come into the market simultaneously, and the effect of their support was to hoist the price with a run. Associated Electrical Industries are easier at 24s. General Electric new ordinary are quoted at 47s. 9d. The 6½ per cent. preference have declined to 33s. 9d. In what may be called the Television group, Electric & Musical Industries, after touching 33s. 3d., reacted to 32s. 3d.

Miscellaneous Matters

Shares in the companies connected with the rubber industry have fallen to-day, Tuesday, owing to disappointment with the exportable quota fixed by the International Regulation Committee. It had been generally supposed that for the new quarter, April-June, this year, the proportion would be dropped to 70 per cent. of the exportable quota. Instead of this, the rate is left at 75 per cent., though a 70 per cent. level comes into force from July 1st for three months. The iron and steel market is also somewhat disappointing. Babcock & Wilcox went back 2s. 3d. to 45s. Other issues in this group showed a disposition to droop. Business in most of the markets is erratic. The air continues to be charged with uncertainty in regard to the possibility of an early General Election, in spite of affirmations to the contrary by Government and other speakers who should certainly be in a position to know what is likely to happen.

Share List of Electrical Companies

	Nom.	Dividend. 1932.	Dividend. 1933.	Price. Feb. 26.	Rise or Fall.	Yield. £ s. d.
Home Electricity Companies.						
Bournemouth and Poole	1	15	15	77/6	−2/-	3 16 2
Brompton Ordinary	1	7	7	36/-	—	3 17 9
Charing Cross Ordinary	1	7	7	34/6	−1/-	4 1 2
Chelsea	1	7	7	36/-	—	3 17 9
City of London	1	7½	7½	37/-	−1/-	4 1 1
Clyde Valley	1	7	7	42/-	—	3 16 2
County of London	1	10½	10½	56/6	−1/6	3 14 5
Edmundson's 7% Pref.	1	7	7	36/6	—	3 16 8
Elec. Dis. Yorkshire	1	9	9	47/6	−1/6	3 15 8
Elec. Supply Corporation	1	11	11	57/6	−⅛	3 16 5
Kensington Ordinary	1	7	7	36/-	—	3 17 9
Lancs Light and Power	1	7	7½	37/-	−1/-	4 1 1
London Electric	1	7	7	39/-	—	3 11 10
Metropolitan	1	10	10	52/-	−2/-	3 17 1
Midland Counties	1	7	7	37/-	−6d.	3 15 8
Mid. Elec. Power	1	8	8	50/-	—	3 4 0
North Eastern Electric Ordinary	1	6	6	32/6	−1/6	3 13 10
Do. 7% Pref.	1	7	7	35/6	—	3 19 0
Northampton	1	10	10	53/9	−1/8	3 14 4
Notting Hill 6% Pref.	10	6	6	14½	—	4 4 4
North Met. Elec. Ordinary	1	10	10	60/9	−6d.	3 5 7
Do. do. 6% Pref.	1	6	6	32/-	—	3 15 0
St. James and Pall Mall	1	7	7½	37/6	—	4 8 0
Scottish Power	1	8	8	41/3	−1/3	3 17 8
South London	1	7	7	36/-	—	3 17 9
Westminster Ordinary	1	7	7	35/6	−6d.	3 19 0
Whitehall Elec. Invst. 7½% Pref.	1	7½	7½	27/-	—	5 11 1
Yorkshire Elec.	1	8	8	44/6	−3/-	3 12 0
Public Boards.						
Central Electricity, 1950–70	Stock	5	5	116	—	4 6 2
Do. 1950–75	„	5	5	120	—	4 3 4
Do. 1951–73	„	4½	4½	112	—	4 0 4
Do. 1963–93	„	—	3½	102	—	3 8 8
London & Home Counties, 1955–75	„	4½	4½	114	+1	3 19 0
London Passenger Transport, A	„	—	4½	123½	—	3 13 0
Do. do. B	„	—	5	125½	—	3 19 8
Do. do. C	„	—	3	93	—	3 4 6
West Midlands Joint Elec. 1948–68	„	—	5	118	—	4 4 9
Telegraph and Telephone.						
American Tel. & Tel.	$100	9	9	107	+1	8 8 0
Anglo-Am. Tel. Pref.	Stock	6	6	121½	—	4 18 7
Do. Def.	„	1½	1½	29	—	5 3 5
Cable & Wireless 5½% Pref.	„	2¾	2¾	83	−½	3 5 8
Do. A. 7½% Ord.	„	Nil	Nil	18½	−¾	—
Do. B. Ord.	„	Nil	Nil	6½	−¼	—
Globe Tel. & Tel. Ord.	10	Nil	2½	11¼	−⅛	2 5 0
Do. do. Pref.	10	6	6	13¾	—	4 8 0
Great Northern Tel.	10	20	20	39½	—	5 1 3
Marconi-Marine	1	10	7½	36/3	—	4 2 9
Oriental Telephone Ord.	1	12	12	3⅞	—	*3 12 5
Home and Foreign Trams, Etc.						
Anglo-Arg. Trams First Pref.	5	Nil	Nil	1/6	—	—
Do. do. 2nd Pref.	5	Nil	Nil	1/6	—	—
Do. do. 5% Deb.	Stock	Nil	Nil	7	—	—
British Electric Traction Df. Ord.	„	5	5	915	−20	—
Do. do. Pref. Ord.	„	8	8	172½	—	4 12 9
Brazil Traction	100	—	—	9	−¾	—
Brit. Columbia Elec. Rly. Pce.	Stock	5	5	100½	—	4 19 6
Mexican Light Common	100	Nil	Nil	2½	—	—
Do. 7% Pref.	100	7	7	4½	—	—
Do. 1st Bonds	$500	5	5	44½	—	—
Victoria Falls Ord.	1	15	20	7⅛	—	2 16 6
Yorkshire (West Riding)	1	2½	5	28/3	—	3 10 9
Manufacturing Companies.						
Aron Electricity Ord.	1	10	10	66/3	+⅛	3 3 3
Assoc. Elec. Ord.	1	4	3	24/-	−6d.	2 10 9
Do. Prf.	1	8	8	37/6	−⅛	4 5 4
Babcock & Wilcox	1	9	6	45/-	−2/3	2 12 9
British Aluminium Ord.	1	5	5	32/-	−6d.	3 2 7
British Insulated Ord.	1	5	15	77/6	−⅛	3 17 2
Brush Ord.	Stock	Nil	Nil	40½	—	—
Callender's	1	15	15	3½	—	4 5 9
Do. 6½% Pref.	1	6½	6½	32/6	—	4 0 0
Crompton Parkinson Ord.	5/-	22	12½	35/6	—	1 15 0
Do. 8% Pref.	1	8	8	35/-	—	4 11 5
Edison-Swan 1st Pref.	1	7½	7½	23/9	—	6 6 4
Electric Construction	1	Nil	Nil	15/-	—	—
Enfield Cable Ord.	1	25	20	4¾xd	−¼	5 2 6
English Electric	1	Nil	Nil	6/3	—	—
Do. do. Pref.	1	Nil	Nil	12/-	—	—
Ever Ready	5/-	35	35	23/-	+2/-	7 12 2
Ferranti Pref.	1	7	7	29/6	—	4 15 0
G.E.C. Pref.	1	6½	6½	33/9	−⅛	3 17 4
Do. Ord.	1	8	8	48/3	—	3 6 4
Henley's	1	30	30	7	—	4 5 0
Do. 4½% Pref.	5	4½	4½	5¾	—	3 16 8
India-Rubber Preferred	1	—	—	1¼	—	—
Johnson & Phillips	1	5	5	28/3	—	3 10 8
Siemens Ord.	1	6½	4	1	—	4 0 0
Telegraph Construction	£1	Nil	Nil	1¼	—	—

* Dividends paid free of Income Tax.

Published Specifications

Compiled expressly for this journal by a firm of chartered patent agents. The numbers in parenthesis are those under which the specifications will be printed and abridged and all subsequent proceedings will be taken.

1933

12180. "Luminous signals for controlling street traffic." E. Curran. April 26th, 1933. (423355.)

12578. "Relaxation oscillation generators." Radioakt.-Ges. D. S. Loewe, and K. Schlesinger. June 1st, 1932. (423394.)

15032. "Electric primary cells." C. J. Gordon. May 24th, 1933. (Cognate application 23395/33.) (423301.)

20251. "Holders for incandescent electric lamps and means for securing shades thereto." W. Beazley. July 16th, 1934. (423359.)

20674. "Snap-action electric switches." T. W. Piper. July 22nd, 1933. (423241.)

20822. "Protective means for alternating-current circuits." International General Electric Co., Inc. July 23rd, 1932. (423244.)

20914. "Luminous tube signs or designs operated by high-frequency currents." A. R. Warner. July 25th, 1933. (423362.)

21368. "Systems of electric motor control." British Thomson-Houston Co., Ltd., A. A. Pollock, and J. A. Jaffrey. July 29th, 1933. (423245.)

21498. "Protective systems for electrical power transformers." British Thomson-Houston Co., Ltd. July 29th, 1932. (423305.)

21521. "Electric clocks." British Sangamo Co., Ltd., and F. R. Butherus. July 31st, 1933. (423369.)

21635. "Television and like apparatus." G. B. Banks, T. W. Collier and Baird Television, Ltd. August 1st, 1933. (423508.)

21793. "Dynamo-electric machinery." R. E. Hopkins and Keighley's (Lifts & Motors), Ltd. August 3rd, 1933. (423448.)

21843. "Electrical signalling systems." Automatic Electric Co., Ltd., and P. N. Roseby. August 3rd, 1933. (423511.)

21909. "Transmission networks for coupling an antenna to a radio receiving system." Kolster-Brandes, Ltd., and R. Moore. August 4th, 1933. (423516.)

21933. "Electric overload protective arrangements." Electrical Improvements, Ltd., and H. B. Poynder. August 4th, 1933. (Cognate application 28548/33.) (423517.)

21954. "Telegraph systems." Automatic Electric Co., Ltd., and H. H. Harrison. August 4th, 1933. (423246.)

21966. "Methods of regulating dynamo-electric machines." British Thomson-Houston Co., Ltd., H. Orchard, and J. A. Jaffrey. August 4th, 1933. (423522.)

22016. "Cathode-ray devices for television and the like." A. G. D. West and Baird Television, Ltd. August 4th, 1933. (423247.)

22033. "Apparatus for the electromagnetic separation or concentration of minerals." B. W. Holman and N. Japolsky. August 4th, 1933. (423523.)

22301. "Electrolytic process." Kuppel & Simeant. August 11th, 1932. (423310.)

22592. "Cathode-ray lighting devices." Ferranti, Ltd., and M. K. Taylor. August 12th, 1933. (423311.)

22698. "Electric discharge lamps." British Thomson-Houston Co., Ltd., C. A. Mason, and G. S. C. Lucas. August 14th, 1933. (423249.)

22791. "Method of preparing electrolytically produced nickel plates for use as anodes in electrolytic plating baths." Falconbridge Nikkelverk Aktieselskap. August 27th, 1932. (423370.)

23603. "Printing-telegraph systems." Marconi's Wireless Telegraph Co., Ltd. September 15th, 1932. (423526.)

26192. "Excitation control systems for synchronous electric motors." British Thomson-Houston Co., Ltd. September 22nd, 1932. (423377.)

26580. "Electromagnetic relay." A. M. Hasley. September 27th, 1933. (423378.)

27185. "Telephone transmitters." Siemens Bros. & Co., Ltd., and G. W. Sutton. October 3rd, 1933. (423257.)

28554. "Manufacture of flexible tubes of polymerised aryl olefines and of insulated electrical conductors." Norddeutsche Seekabel-Werke Akt.-Ges. November 21st, 1932. (Divided out of 28553/33.) (423314.)

29045. "Adjustable twin antenna." T. E. Harris and J. S. Somers. October 20th, 1933. (423383.)

30184. "Earthing devices for use with electrical systems." London Electric Wire Co. & Smiths, Ltd., and E. L. Wildy. October 31st, 1933. (423385.)

30219. "Photo-electric control apparatus." General Electric Co., Ltd., E. M. Eden, and C. W. Stopford. October 31st, 1933. (423386.)

30586. "Automatic gain-control arrangements for radio receivers and the like." Marconi's Wireless Telegraph Co., Ltd. November 3rd, 1932. (423389.)

30842. "Thermionic-valve amplifiers fed from an alternating current supply." Dr. O. K. Kolb. November 6th, 1933. (423268.)

32619. "Electrical apparatus comprising a circuit arranged partly in a case and partly in a hinged lid thereof." General Electric Co., Ltd., and A. Howarth. November 22nd, 1933. (423319.)

32892. "Control systems for electric discharge apparatus." Siemens-Schuckertwerke Akt.-Ges. November 24th, 1932. (Cognate application 32893/33.) (423535.)

33158. "Flicker-producing devices for electric fires and the like." H. H. Berry and C. A. Painton. November 27th, 1933. (423459.)

33482. "Circuits comprising gasfilled triodes." General Electric Co., Ltd., C. R. Dunham, and S. K. Lewer. November 29th, 1933. (423390.)

34828. "Transmission systems for supplying music and other broadcast matter." British Thomson-Houston Co., Ltd., G. S. C. Lucas, and E. S. Hall. December 11th, 1933. (423274.)

35479. "Phase indicating or controlling apparatus." Marconi's Wireless Telegraph Co., Ltd. December 30th, 1932. (423323.)

36343. "Ignition coil." Electric Auto-Lite Co. December 24th, 1932. (423540.)

1934

1734. "Light-controlled apparatus." Naamlooze Vennootschap Machinerieen-en Apparaten Fabrieken. January 17th, 1933. (423395.)

1963. "Electrical eddy-current furnace." Allmänna Svenska Elektriska Aktiebolaget. December 4th, 1933. (Cognate applications, 1964/34 and 1966/34.) (423326.)

6736. "Protective systems for electric distribution networks." British Thomson-Houston Co., Ltd. March 2nd, 1933. (423544.)

7508. "Circuit interrupters." Westinghouse Electric & Manufacturing Co. April 8th, 1933. (423545.)

7703. "Regulating devices for immersed-electrode type electric water-heaters." J. T. Shevlin (Siemens-Schuckertwerke Akt.-Ges.). March 10th, 1934. (Addition to 416546.) (423332.)

10713. "Fuse insulators." J. B. Rumford. April 9th, 1934. (423402.)

11633. "Miners' and like electric battery lamps." A. G. Gulliford, C. G. Youle, and S. Blakey. April 18th, 1934. (423550.)

11769. "Oscillatory electric circuits." Telefunken Ges. für Drahtlose Telegraphie. April 21st, 1933. (423404.)

12362. "Means for heating water electrically." L. Marien and A. Marien. July 19th, 1933. (423285.)

12497. "Amplifiers for use in wireless receiving sets and other purposes." Naamlooze Vennootschap Philips' Gloeilampenfabrieken. June 21st, 1933. (423552.)

15273. "Electric switches." British Thomson-Houston Co., Ltd. May 31st, 1933. (Cognate application 15274/34.) (423555.)

16388. "Electrical insulation." British Thomson-Houston Co., Ltd. June 6th, 1933. (423413.)

16930. "Welding rods and wires and method of electric-arc welding." J. F. Wood. June 7th, 1934. (423479.)

18712. "Coin-controlled telephone apparatus." Telephon-Apparat-Fabrik E. Zwietusch & Co., Ges. June 24th, 1933. (423560.)

22955. "X-ray tubes." C. H. F. Muller Akt.-Ges. September 6th, 1933. (423567.)

23154. "Electric circuit-breakers." Allmänna Svenska Elektriska Aktiebolaget. August 25th, 1933. (Addition to 408077.) (423424.)

26155. "Relays for electrical remote-control systems." Landis & Gyr Akt.-Ges. September 15th, 1933. (423488.)

29939. "Ultra-short wave signalling systems." C. Lorenz Akt.-Ges. October 25th, 1933. (Addition to 331667.) (423495.)

30462. "Cathode-ray tubes more particularly for television." Radioakt-Ges. D. S. Loewe, and K. Schlesinger. June 27th, 1932. (Cognate application 36073/33.) (Divided out of 18120/33.) (483427.)

32577. "Electric primary cells." C. J. Gordon. May 24th, 1933. (Cognate application 34574/33.) (Divided out of 423301.) (423353.)

Trade Mark Applications

The following are among the recent applications for British trade marks. Objections against any of the proposed marks may be entered within one month from February 20th:—

Efesite. No. 557123. Class 8. Electric cables.—Falk, Stadelmann & Co., Ltd., 91, Farringdon Road, E.C.1.

Fortamax. No. 555015. Class 11. Low-tension electrical batteries specially for use with apparatus to aid the hearing of deaf persons.—Fortiphone, Ltd., 308, Regent Street, W.1.

M.K. (lettering only, and also lettering and design). No. 547310. Class 13. Contacts, plugs, sockets, adaptors, fusible cut-outs, switches (ordinary), switch-plugs, fuse-boards and switchboards (not fitted), all being metal goods for electrical purposes.—M.K. Electric, Ltd., Wakefield Street, Edmonton, N.18.

Autoflex. No. 555925. Class 18. Road traffic signalling system.—Siemens & General Electric Signal Co., Ltd., Caxton House, Westminster, S.W.1.

Plextol. No. 551674. Class 50. Electrical insulating materials made of plastic mouldable compositions.—Rohm & Haas Gesellschaft, Darmstadt, Germany (British representatives: Frank B. Dehn & Co., Kingsway House, 103, Kingsway, W.C.2).

Artamur, No. 557051, and Artmur, No. 557052. Class 50. Laminated decorated sheeting made from synthetic resin.—Bakelite, Ltd., 68, Victoria Street, Westminster, S.W.1.

Vitreous-enamelled Steel Reflectors for Lighting

The B.S. Specification for industrial reflector fittings for electric lighting, No. 232, which was issued in 1926, has been revised. The chief modification is in Clause 6, which, instead of specifying the distribution of light from the reflector and lamp as a ratio of the maximum candle-power in any direction within 15 deg. of the downward vertical axis to the average of the candle-powers at certain angles, now states that it shall comply with the requirements of B.S.S. No. 398 (a) III, which is the intermediate class of the direct class of lighting in the British Standard Classification of light distributions. A column giving the nominal lumens of the lamp has also been added to the table and it is required that where the polar curve of light distribution is given the candle-power values shall be those resulting from the use of lamps whose output in lumens is in accordance with this column. A new clause has been added with regard to the test lamp, and the appendix has been deleted.

In addition the title of the specification has been changed to "B.S.S. for Vitreous-enamelled Steel Reflectors for Electric Lighting—Open Dispersive Type." Copies (No. 232: 1935) may be obtained from the British Standards Institution, 28, Victoria Street, London, S.W.1, price 2s. 2d. each post free.

New Work for Contractors

Particulars of new works and building schemes for the use of electrical installation contractors and traders

Publication in this list is no guarantee that electrical work is definitely included. Alleged inaccuracies should be reported to the Editors.

Abergele & Pensarn.—Houses (50); R. O. Roberts, U.D.C. surveyor.

Arbroath.—Additions to Public Health Hospital; burgh surveyor.

Barnes.—Flats (106), Grange Road, for E. Fowler.

Barnsley.—School of art and schools, Littleworth, Wilthorpe, Kendray & Worsborough, for Borough E.C.; director of education.

Bedford.—Houses, Cardington Road; Robinson & Hall.

Berkshire.—School, Didcot (£11,759), for County E.C.; Building & Public Works Construction Co., Ltd., builders, Swindon.

Bexhill-on-Sea.—Houses (29), London Road site; borough surveyor.

Bicester.—Houses (46); U.D.C. surveyor.

Billinge and Winstanley.—Houses (44); U.D.C. surveyor.

Bishop's Tawton (Devon).—Methodist church; W. B. Oliver, architect, Barnstaple.

Bournemouth.—Houses, Kinson and Lingdale Road; borough engineer. Cinema and shops, Charminster Road; S. Kermode. Reconstruction of 609-613, Christchurch Road; F. W. Woolworth & Co., Ltd.

Bramhall.—Houses (500), Bosdon Fold Estate, Hazel Grove; W. G. West, builders, Highfield Park, Bredbury, Stockport.

Brighouse.—Extensions to Girls' Secondary School (£25,700); Town Clerk.

Brighton.—Zoo, restaurants, buildings, &c., Withdean Estate; Sir Chas. Allom, architect.

Brownhills (Staffs).—Houses (78); U.D.C. surveyor.

Buckinghamshire.—Grammar school, Slough, for County E.C.; county architect, Aylesbury.

Bursiem.—Factory, Murhall Street, for Leicesters, Ltd.

Caernarvon.—Houses (148), Ysgubor Goch; borough surveyor.

Cambridge.—Schools, Perne Road, and Union Road, for Borough E.C.

Canterbury.—Houses (294), Thanington and Vauxhall sites; H. M. Enderby, city engineer.

Carlisle.—Five years' housing scheme (160 per annum); city surveyor.

Cheshire.—Secondary school, The Avenue, Sale (£36,000), for C.C.; F. Anstead Browne, county architect, The Castle, Chester.

Chesterfield.—Houses (54), Grassmoor; R.D.C. surveyor.

Chichester.—Post office; F. Privett, builder, Portsmouth.

Chislehurst (Kent).—Library Red Hill; county architect.

Corby (Peterborough).—Houses, for Corby Properties, Ltd.; secretary.

Coventry.—Houses (110); E. H. Ford, city engineer. Works, By-pass road (£161,000), for John Mowlem & Co., Ltd.

Croydon.—Houses (20), Green Lane; B. G. Nutting.

Dartford.—Development of Rochester Way; W. E. Rice.

Dawlish.—Houses (240), Marina Estate; Dawlish Land Co., Ltd.

Denham (Mdx.).—Film studios (£300,000), for the London Film Productions.

Dover.—Houses (110), St. Radigund's Estate; borough surveyor.

Dukinfield.—Houses (60), Thorncliffe Avenue; E. N. Stannion, surveyor, Town Hall.

Dunfermline.—Houses (92); burgh surveyor.

Dunmow (Essex).—Houses (42); R.D.C. surveyor.

Dunstable.—Additions to works for the A.C.-Sphinx Sparking Plug Co., Ltd.; N. F. Stockbridge, managing director.

Easington (Durham).—Cinema, Seaside Lane; Yoden Cinemas, Ltd.

East Elloe.—Houses (24), Sutton Bridge; A. E. Palmer, architect, 1a, Pinchbeck Street, Spalding.

Eastry (Kent).—Houses (200), Sholden, and 100 houses at Aylesham, for the First National Housing Trust.

Eccles.—Schools, Winton, for Borough E.C.; Mr. Brown, secretary.

Epping.—Houses (20); E. J. Higgins, builder, Potter Street.

Essex.—Public Assistance Institution, Suttons Lane, Hornchurch, for C.C.; J. Stuart, county architect, Chelmsford.

Eton.—Houses (20), Wraysbury; R.D.C. surveyor.

Farnborough (Kent).—Extensions to hospital (£60,000); county architect.

Feltham (Mdx.).—Development of Tachbrook Road; A. Robinson.

Glasgow.—Shops, Barlock Street, Possilpark; Galbraith's Stores, Ltd.

Gosforth (Northumberland).—Houses (26); Cussins, Ltd., builders, Grange Park Estate.

Great Yarmouth.—Houses (64) and flats; borough surveyor.

Greenwich.—Houses and clearance scheme, Lamb Street; borough engineer.

Grimsby.—Houses (100), Nunsthorpe (£29,108); Steel & Goddard.

Guildford.—Shopping centre, &c.; Onslow Village, Ltd.

Hedon.—Houses (51); Sanitary & Works Committee.

Hertfordshire.—School (800 places), Beaumont's Estate, St. Albans; director of education, Hertford.

Hinckley.—Houses (98); U.D.C. surveyor.

Hoole.—Houses (60), Pine Grove; U.D.C. surveyor.

Ilford.—Practical instruction centre, Loxford schools, for Borough E.C.; L. E. J. Reynolds, educational architect.

Kenley (Surrey).—Development of Haye Estate; West Wickham (Kent) Land Development Co., Ltd.

Kent.—School clinic, Sandwich, and schools, Bexley, Faversham, Gravesend, Halstead, Maidstone, Otford, and additional schools, Orpington; also extensions to County Offices, Maidstone (£35,000); county architect. School, Tenterden, for County E.C.; E. Salter Davies, director of education, Maidstone.

Kettering.—Houses (66), Piper's Hill Lane; Drury & Co.

Kilburn.—Cinema (5,000 seats), High Road, for the Gaumont British Picture Corporation.

Kilmarnock.—Houses (36), Western Avenue, electrical work; James Hay & Steel, architects, West George Street.

Leamington.—Maternity block, Warneford Hospital; Hospital governors.

Leeds.—New Queen's Hotel (£250,000), for London, Midland & Scottish Railway Co., Ltd.; A. Towle, controller of hotel services.

Leicester.—Houses (250), Braunstone; housing architect, 18, Highcross Street. Buildings, Wyggeston School (£39,650); J. C. Kellett & Son.

Lincolnshire.—Extensions to institution, including three blocks, male and female wing, and casual wards, Sleaford, for C.C.; C. B. Metcalfe, architect, County Offices, Sleaford.

Linthwaite (Yorks).—Houses (40); U.D.C. surveyor.

London.—(Aldgate).—Building, Aldgate Avenue; H. Lotery & Co., Ltd. (Southwark).—Dwellings, Tarn Street and Rockingham Street (£25,000); L.C.C. architect. (Westminster).—Buildings, 78-94, Brompton Road; Myer & Watson-Hart. Maternity centre, &c., Bessborough Street (£45,000); city engineer.

Louth.—Houses (42); A. E. Houfton, builder.

Luton.—Houses (81), Carisbrooke Lane, for A. H. Horne.

Lyminge (Kent).—Hospital accommodation, for the institution (£140,000); county architect.

Maldon (Essex).—Houses (69), Park Drive Estate; E. Unwin, architect, 18, Queen Anne's Gate, Westminster, London, S.W.

Manchester.—Houses (38), Middleton Road, Crumpsall; Roberts & Wood, architects, 26, King Street. Five-storey building, St. Peter's Square, for Friends' Provident and Central Life Insurance Office, 7, Leadenhall Street, London, E.C.3 (£100,000); J. Gerrard & Sons, Ltd., builders, Pendlebury Road, Swinton.

Middlesex.—Grammar school, Hampton (£24,000), for County E.C.; director of education, 40, Eccleston Square, London, S.W. School, Southgate; county architect.

Monmouth.—Houses (40), Rockfield Road; town clerk.

Muswell Hill (Mdx.).—Cinema (2,000 seats), for the Odeon Theatre Circuit, Birmingham.

Newcastle-on-Tyne.—Houses, Devon Gardens; Marshall & Tweedy, architects, Pilgrim Street.

Northholt (Mdx.).—Estate development of Yeading Road; W. J. Ross.

Norwich.—Elementary school, Mousehold Avenue, for E.C.

Patcham (Sussex).—Houses (24), Singleton Road; Braybons, Ltd.

Preston.—Civic aerodrome; Tynemouth borough engineer.

Ramsbottom.—Houses (54); U.D.C. surveyor.

Redcar.—Cinema for Thompson's Enterprises, Ltd.; G. W. Lazenby & Co., builders, Ferryhill.

Redhill.—Cinema for the Odeon Theatre Circuit, Birmingham.

Retford.—Houses (80), Ordsall; borough surveyor.

Rochdale.—Senior schools, Brimrod and Greenbank, for E.C.; S. H. Morgan, borough surveyor, Town Hall.

Runwell (Essex).—Extensions to Mental Hospital (£50,000); borough surveyor.

Saltcoats.—Houses, Public Park and Millar Road; J. Edwards, 260, Great Western Road, Glasgow.

Slough.—Houses (48), near Stoke Poges Lane, for H. Street & Co.

Smallburgh.—Council chamber and public offices, Stalham; A. Peploe, clerk.

Smethwick.—Houses (74), Norman Road (£21,548); borough engineer. Factory, Alma Street; Fred. Crane Chemical Co., Ltd.

South Harrow.—School, Tithe Farm Estate; W. T. Curtis, architect, Guildhall, London, S.W.1.

Southgate.—Houses (30), Chestnut Close and Merrivale; J. Neilson. Houses (28), Farmleigh, Nurseries Estate, Avenue Road; Harwood, Nash & Co.

Staffordshire.—Technical college, Victoria Road, Stafford (electrical work), for County E.C.; Lieut.-Col. G. C. Lowbridge, education architect, Stafford.

Sunderland.—Houses (50), new building estate, Tunstall; G. E. Matkin, Barclay's Bank Chambers.

Surrey.—Central schools, Warlingham, and West Byfleet, for County E.C.; secretary, Kingston-on-Thames.

Sutton Coldfield.—Houses (91), Oakwood Estate; E. A. Coleman.

Swansea.—Houses (24), Beaumont Crescent, Elmhurst Crescent, &c.; H. A. Enoch. Houses (102), Mayhill (£30,000); Edward Rich & Son, Swansea. Depôt and bakery, Banwell Street; Hopkin, Morgan, Ltd. Modernising Dunvant School; borough architect.

Tamworth.—Houses (90), Drayton Bassett, for Mr. Leake.

Taunton.—Houses (36); J. Standerwick & Sons, Ltd., builders, Bridgwater.

Tiverton.—Extensions to hospital, with electrical and central heating work (£9,500); District Hospital Secretary.

Tynemouth.—Houses, Verne Road; B. Peel, Ltd.

Wantage.—Houses (62); R.D.C. surveyor.

Warwickshire.—School, Lundon End, Solihull; county architect.

Washington (Durham).—Houses (30); J. E. Gardner, builder, Gateshead-on-Tyne.

Westslade (Northumberland).—Houses (100); U.D.C. surveyor.

Westmorland.—Admission block to the Mental Hospital, for C.C. (£50,000). Extensions, Kendal High School (£15,000), for County E.C.; director of education, Kendal.

Whitehaven.—Houses (129), Woodhouse Estate; borough engineer.

Wood Green.—Modernisation of Western Road baths (£15,750); borough engineer.

Yeovil.—Houses (129), Westfield Estate; C. G. Tovey & Son, builders.